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FROM THE

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CONTENTS

No.
1329. Examination and survey of Bayou Teche, La.
1330. Report on Kahului Harbor, Hawaii.
1336. Examination and plan for improvement of Vermilion River, La.
1341. Examination and survey of Raritan River, N. J.
1342. Examination and survey of Fancy Bluff Creek, Ga.
1351. Examination of Port Orford Harbor at Grave Yard Point, Oreg.
1352. Examination of Port Orford Harbor, Oreg.
1353. Examination of old bed of Tchula Lake, Miss.
1354. Examination of Darien Harbor, Ga.
1355. Examination of Hughes River, W. Va.
1356. Examination and survey of Northeast Branch of Cape Fear River, N. C.
1357. Examination of Gloucester Harbor, Mass.
1358. Examination of Yaquina Bay and bar entrance, Oreg.
1359. Examination of Tonawanda Creek at North Tonawanda, N. Y.
1362. Examination and survey of Bennett River, N. C.
1363. Examination of Red River near Fulton, Ark.
1364. Examination of Mille Lacs Lake and Onamia Lake, Minn.
1369. Examination and survey of Providence River and Harbor, R. I.
1370. Examination of Wessaweskeag River, Me.
1371. Examination of harbor at Springbay, Ill.
1382. Examination and survey of Sturgeon Bay and Lake Michigan Ship Canal.
1383. Examination and survey of Deep Creek, N. C.
1384. Examination of Coal River, W. Va.
1385. Examination of Elk River, W. Va.
1386. Examination of Youngs Bay and River, Oreg.
1387. Examination and survey of Narrows of Lake Champlain, N. Y. and Vt.
1389. Examination of Savannah River at North Augusta, S. C.
1390. Examination of Galveston Harbor and adjacent waterways, Tex.
1391. Examination and survey of Terry Creek and Back River, Ga.
1396. Examination of Mahoning River, Ohio.
1397. Examination of St. Johns River from Lake Harney to Lake Washington.
1406. Examination of Chesapeake Bay off Pooles Island, Md.
1410. Examination of New River from Radford, Va., to Hinton, W. Va.
1416. Examination and survey of Wills Strait, Casco Bay, Me.
1418. Survey of Sulphur River, Tex. and Ark.
1436. Examination and survey of Salem River, N. J.
1437. Examination of Marco Pass and harbor at Marco, Fla.
1439. Examination of Cabin Branch and Curtis Creek, Md.

62D CONGRESS, 3d Session. | HOUSE OF REPRESENTATIVES. | DOCUMENT No. 1329.

BAYOU TECHE, LA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION AND SURVEY OF BAYOU TECHE, LA., WITH VIEW TO SECURING INCREASED DEPTH.

FEBRUARY 1, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 30, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 29th instant, together with copies of reports from Lieut. Col. L. H. Beach, Corps of Engineers, dated July 29, 1909, and June 10, 1911, with map, on preliminary examination and survey, respectively, of Bayou Teche, La., made by him in compliance with the provisions of the river and harbor act approved March 3, 1909.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 29, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Report on preliminary examination and survey of Bayou Teche, La.

1. There are submitted herewith for transmission to Congress reports dated July 29, 1909, and June 10, 1911, with map, by Lieut. Col. L. H. Beach, Corps of Engineers, on preliminary examination

and survey, respectively, of Bayou Teche, La., with a view to securing increased depth, called for by the river and harbor act approved March 3, 1909.

2. Bayou Teche is a stream in southern Louisiana, having its source in Bayou Courtableau in St. Landry Parish, and flows in a southeasterly direction a distance of 124 miles, joining the lower Atchafalaya River about 12 miles above Morgan City, La. The available depth in the Atchafalaya from mouth of the Teche to the Gulf is about 20 feet. The Teche lies in the drainage area of the Atchafalaya River, which empties into the Atchafalaya Bay, an inlet of Gulf of Mexico.

3. The existing project for improvement of Bayou Teche provides for a 6-foot navigation to Arnaudville, 106 miles above the mouth, by dredging, removal of snags, and the construction of a lock at Keystone. The total expenditures on this and earlier projects to June 30, 1912, were approximately $216,000. The commerce of the bayou now amounts to about 1,000,000 tons per annum, having a value estimated at $6,500,000. The greater part of this commerce pertains to the lower portion of the stream, where the existing channel facilities have proven to be inadequate.

4. The district officer is of opinion that some relief from existing conditions is necessary, and after consideration of a number of suggested depths and widths he reaches the conclusion that any depth in excess of 8 feet could be obtained only at a cost disproportionate to the benefits to be derived therefrom. He is of opinion, however, that the construction of a channel 8 feet deep and 100 feet wide from the mouth to New Iberia, and thence 6 feet deep and 60 feet wide to the lock site, at an estimated cost of $551,550, is warranted under certain conditions of local cooperation. The district officer also gives consideration to the advisability of extending navigation from the lock site to the head of the stream at its junction with Bayou Courtableau. Estimates of $359,150 and $337,250 are submitted for locks of 8 feet and 10 feet lift, respectively, the latter being the cheaper on account of the smaller amount of auxiliary dredging required. While some opposition to this improvement in connection with a proposed dam in the Courtableau was manifest at the time of the submission of the report on the survey, the district officer expressed the opinion that in view of the important public benefits to be expected, this opposition should not be allowed to prevail, and he therefore recommended that the work be undertaken.

5. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 23, 1912. At the request of the board, certain supplemental estimates were procured from the district officer, and the subject has been given extended consideration in view of the uncertainty which existed regarding the ultimate relation of the upper section of the bayou and the improvements proposed by the district officer to the extensive drainage projects under consideration by local authorities. As explained by the board, this question has now adjusted itself, and certain local drainage districts have been authorized by the Secretary of War to close Bayou Courtableau near its mouth by extending a levee along the west bank of the Atchafalaya with the understanding that they will provide a suitable boat outlet from this bayou into Bayou Teche, either by a lock and dam or by dredging. It thus appears that the utilization

of Bayou Teche as an outlet for the Courtableau will probably be accomplished by those concerned and in such a manner as to afford the necessary navigation facilities in this portion of the stream. The board therefore expresses the opinion that it is not advisable for the United States to undertake any improvement of the Teche above the lock site. The board believes, however, that it is advisable for the United States to provide a channel 8 feet deep and 80 feet wide up to New Iberia, and thence 6 feet deep and 60 feet wide to the lock site, at a total estimated cost of $315,000, and $3,000 annually for maintenance, contingent upon the donation by local interests of the lands necessary for turning basins and for dumping places along the banks.

6. After due consideration of the above-mentioned reports I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Bayou Teche with a view to securing increased depth is deemed advisable so far as to secure an available channel depth of 8 feet and a channel width of 80 feet from the mouth to New Iberia, and thence 6 feet deep and 60 feet wide to the lock site at Keystone, increased at entrances and on curves, following in general the methods described in the report of the district officer as modified by the report of the Board of Engineers for Rivers and Harbors, at an estimated cost of $315,000 for first construction and not less than $3,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $100,000 and subsequent appropriation of about $107,500 per year for two years.

W. H. Bixby,
Chief of Engineers, United States Army.

REPORT OF BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

To the Chief of Engineers, United States Army:

1. Bayou Teche has its source in Bayou Courtableau and flows in a southeasterly direction for about 124 miles to where it joins the lower Atchafalaya River about 12 miles above Morgan City. At the present time there is an available channel of about 7 feet in depth and 60 feet in width to Franklin, 16 miles; 6 feet by 40 feet to Jeanerette, 42 miles; 5½ feet by 40 feet to New Iberia, 54 miles; and 4 feet by 30 feet to the lock site, 72 miles above the mouth.

2. The lock and dam now under construction will give a channel 6 feet in depth and a width of about 60 feet up to Arnaudville, 106 miles above the mouth. The pool will extend to Leonville, 114 miles above the mouth, leaving a distance of 10 miles to the Courtableau, over which reach the bed of the Teche at low water consists of a series of pools separated by shoals which are at an elevation above low water in the Courtableau.

3. Owing to the physical characteristics of the stream, the district officer divides it for convenient consideration into two sections:

A.—Mouth to the lock site, 72 miles.

B.—Lock site to head, 52 miles.

4. *A. Mouth to the lock site.*—This section of the Teche now carries practically all of the commerce of the stream. The banks are lined with plantations, and there are a number of small towns, the principal ones being New Iberia, Jeanerette, and Franklin. The commercial statistics for 1909 give the shipments as 99,090 tons, with a value of $3,189,435, and the receipts as 900,035 tons, with a value of $3,422,080, making a total of 999,125 tons, with a value of $6,611,515. The largest item of commerce is logs, of which there is a tonnage of 757,790, with a valuation of $1,653,375. Deducting this from the total leaves 241,335 tons of miscellaneous commerce valued at $4,958,140. In a subsequent communication the district officer gives the total tonnage for 1911 as 1,016,116, with a valuation of $6,581,700. There has been expended on this stream to June 30, 1912, approximately $260,000. Formerly the commerce of the Teche was largely local, but with the opening of the Plaquemine route, a boat and barge line has been established between New Iberia and New Orleans and is now operating regularly and is taxed to the full capacity of its equipment. During the past season three lines of boats and as many independent steamers handled sugar between Teche points and New Orleans. The district officer believes that a channel at least 8 feet in depth, with a bottom width of 100 feet, should be made available to New Iberia in order to meet the demands of navigation. While the lock to be built will have a depth of 8 feet over the sills and the pool will give an 8-foot navigation for several miles above the lock, on account of the much smaller tonnage above New Iberia the district officer believes that a 6-foot channel, with a bottom width of 60 feet, will be sufficient for some years above New Iberia. Turning basins are proposed at Franklin, Jeanerette, New Iberia, and Loreauville. The estimate for the proposed 8-foot channel to New Iberia and 6-foot channel to the lock site is $551,550, and the district officer believes this expenditure is warranted, although he believes it should be coupled with the proviso that the lands necessary for turning basins and dumping places along the banks for dredge material should be furnished without cost to the United States.

5. *B. Lock site to head.*—There is very little commerce on this section of the Teche and none above Arnaudville, and any improvement by the General Government must be based on prospective commerce. Based on this commerce alone, the district officer states that the improvement would hardly be warranted at this time, but considering that it will serve as an outlet to commerce on Bayou Courtableau and open up 82 miles of waterway will ultimately be advisable. Two plans are outlined for the improvement of this reach, to cost, respectively, $359,150 and $337,250.

6. In addition to the above estimates, the district officer in subsequent communications has submitted the following at the request of the board:

Channel 8 feet deep and 80 feet wide to New Iberia	$255,000
Channel 6 feet deep and 80 feet wide to New Iberia	75,000
Channel 6 feet deep and 60 feet wide from New Iberia to the lock site	60,000

The estimate for maintenance submitted by the district officer is $3,000 per year. The board is inclined to believe that this estimate may prove insufficient.

7. At the request of the board, interested parties were invited to submit their views regarding the necessity and advisability of the United States undertaking additional improvement of the Teche. A number of communications have been received and given consideration, and on December 16, 1912, Hon. R. F. Broussard, M. C., appeared in behalf of the improvement.

8. The commerce of the bayou now amounts to about 1,000,000 tons per annum, valued at approximately $6,500,000. This large and important commerce fully justifies such reasonable facilities for navigation as can be provided and maintained at commensurate cost. Decision as to the advisability of improving the river above the lock site has been complicated and delayed by the uncertainty as to the ultimate relation of this section to the extensive drainage projects under consideration by local authorities. This question, however, has recently been settled. At the request of the Board of Commissioners of the Atchafalaya Basin Levee District and of the Red River, Atchafalaya, and Bayou Boeuf Levee District, assisted by the Louisiana State Board of Engineers, the Secretary of War has granted permission to close Bayou Courtableau near its mouth by extending a levee along the west bank of the Atchafalaya, and as stated by the district officer in a supplemental report on the improvement of Bayou Courtableau, it appears that the utilization of Bayou Teche as an outlet for the Courtableau will probably be accomplished by those concerned and in such a manner as to afford the necessary navigation facilities in this portion of the stream.

9. In view of the situation presented above, the board is of opinion that it is not advisable for the United States to undertake any improvement of the Teche above the lock site. It believes, however, that the commercial importance of this stream justifies some increase of navigation facilities below this point and that it is advisable for the United States to provide a channel 8 feet deep and 80 feet wide up to New Iberia and thence 6 feet deep and 60 feet wide to the lock site, at a total estimated cost of $315,000 and the necessary amount annually for maintenance, contingent upon the donation by local interests of the lands necessary for turning basins and for dumping places along the banks. The initial appropriation should be $100,000, with subsequent appropriations sufficient to complete the work in three years.

10. In compliance with law, the board reports that except as contemplated by the above recommendations there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF BAYOU TECHE, LA.

War Department,
Engineer Office, United States Army,
New Orleans, La., July 29, 1909.

Sir: 1. This office was charged, by letter from the Chief of Engineers of March 8, 1909, with the report upon the preliminary examination of Bayou Teche, La., with a view to securing an increased depth, as directed by the river and harbor act of March 3, 1909.

2. Bayou Teche is not a stream of flowing water in the ordinary acceptation of the term, and resembles few other waterways of the country. It is actually a channel located upon the summit of a ridge. The banks of the bayou are from 100 feet to 1,000 feet wide, beyond which the land slopes away from the bayou on the east toward the Atchafalaya, on the west toward the Vermilion River. Owing to the flatness of the country the slope is, however, very slight. The Teche may be said to begin in the southeastern portion of St. Landry Parish, adjacent to Bayou Courtableau, and extends east of south through St. Martin and St. Mary Parishes for a distance by the channel of about 124 miles to the Atchafalaya, 12 miles above Morgan City. The section through which it passes has a soil of proverbial fertility and is one of the richest agricultural portions of the country. The Teche has been the subject of several previous examinations and reports, as follows:

Date.	Surveys.	A. R., C. of E.	Page.
1870	Survey for removing obstructions	1870	347–351
1879	For improvement by locks and dams	1880	1166
1882	Charenton Canal to Port Barre	1883	1113
	Improvement by locks and dams	1885	1397
1885	Charenton Canal to mouth	1885	1398
1886	For slack-water navigation in upper Teche	1886	1248
1889	Examinations with a view of putting in locks and dams	1889	1515
1895	St. Martinville to Port Barre	1895	1788
1897	St. Martinville to Port Barre for 6-foot channel	1897	1783
1905	....do.[1]	1905	1454

[1] (H. Doc. No. 527, 59th Cong., 1st sess.)

3. The present project, adopted in 1891, provided for the removal of obstructions between St. Martinville, La., and the mouth of the bayou, a distance of about 80 miles. This project was modified by the river and harbor act of March 2, 1907, so as to provide a 6-foot navigation to Arnaudville by the construction of a lock and dam about 4 miles below St. Martinville. The work of construction has not yet been done, owing to legal complications. Navigation has been possible to Breaux Bridge by shallow-draft boats during high-water stages. At low water New Iberia is practically the head of navigation, although some small boats succeed occasionally in reaching St. Martinville.

4. The bayou has gradually shoaled until its depth is now considerably less than what it was 20 or 30 years ago. This is probably due to the cultivation of its banks and the soil being gradually washed into the bayou. The Teche does not possess sufficient current to enable it to scour away the material carried in in this manner. Its water shed is very limited, being practically confined to the sloping

banks of the bayou. The crest of these banks varies from 100 feet to approximately 1,000 feet in distance from the stream, while beyond the crest the land slopes from the bayou. The rainfall on this very limited watershed gives no supply, except the immediate run-off at the time of rainfall. There is no conservation of rainfall, as the drainage is in all cases directly into the bayou. Some water is obtained from Bayou Courtableau when that stream rises to a greater height than 8 feet. A small amount of water is sometimes obtained from the Vermilion River through Bayou Fusilier, a channel connecting the Teche with the Vermilion. When the latter stream is higher than the Teche it contributes some of its waters, but when the Vermilion is lower than the Teche, Bayou Fusilier serves as an outlet. At low water the Teche is practically a slack-water route, the slight current in the stream following the ebb and flow of tide. As normal tides in the Gulf of Mexico are but little more than 1 foot, this cause does not produce much flow.

5. The relief requested by parties interested in the navigation of the waterway and commercial interests along the bayou is that the channel be dredged so as to provide a depth of 15 feet to New Iberia, La. The object of this depth is to permit coasting schooners to enter the bayou so that its products can be shipped direct from its banks to the various markets.

6. The commerce of the Teche is, even in its present condition, of large magnitude, and there is every reason to believe that it would be increased could a greater depth be afforded. The annual commerce is practically as shown in the following table:

	Tons.	Value.		Tons.	Value.
Sawlogs	547,120	$1,865,929	Machinery	1,410	$136,900
Lumber	60,875	218,850	Fuel oil	86,000	280,000
Cotton	1,086	213,450	Fertilizer	3,720	74,400
Cottonseed products	6,187	102,747	Coal	5,400	30,000
Rice	2,940	113,081	Cooperage	4,860	87,480
Sugar	48,111	3,848,880	Merchandise	18,090	698,371
Sugar cane	70,000	245,000			
Molasses	9,036	307,224	Total	864,835	8,222,312

7. The class of tonnage produced along the Teche is of such a nature that barge transportation to Morgan City and reshipment of the bulky freight at that point would place upon the shipper such an increased expense that the method practically becomes impracticable. The greatest item of seagoing tonnage originating on the Teche is lumber of various kinds. With 15 feet of water in the bayou this could be shipped directly to eastern ports, these being the points to which it now goes by a combination of routes. There are numerous sawmills along the bayou. The product of 10 of these mills, from which it was possible to obtain statistics, is as follows:

	Feet.	Tons.	Value.
Logs towed to mills	143,533,000	547,120	$1,865,929
Cut of lumber	140,470,000	851,175	3,511,750
Shingles	194,100,000	29,115	526,775
Laths	53,533,000	13,383	160,599
Factory work			433,500
Cords of wood for fuel	30,050		60,100

8. The largest agricultural interest along the Teche is the raising of sugar cane. The sugar plantations are large and most of the factories are located along the bayou. There are, below St. Martinville, 37 large factories on its banks. A statement concerning the cane growers and factories in the parishes traversed by the bayou and tributary to it is as follows:

Parish.	Cane growers.	Sugar factories.	Daily capacity.
			Tons.
St. Martin	14	3	2,400
Iberia	51	16	9,100
St. Mary	79	28	16,840
Totals	144	47	28,340
Annual tonnage of cane			3,177,000

Sugar produced therefrom, 545,000,000 pounds, or 272,500 tons.

Almost this entire tonnage is grown along the banks of the Teche, with an average haul of not more than 1 mile of the water's edge. If the Teche were improved, the sugar planters could transport a larger proportion of the cane to central sugar mills, which would permit the use of larger barges than is possible at present. As the value of cane is seldom over 1½ cents per pound, it is readily seen that only a slight expense for transportation destroys its profitable value. With greater depth of water in Bayou Teche, cane could be taken to the mills much more cheaply and the products carried away at much less expense.

9. Another important feature of the deepening would be the decreased cost of fuel. Although the lumber and sugar mills use waste products for a large part of their fuel, a reduction upon the price of oil and coal would still be of great benefit.

10. Owing to the great demand for cars during the fall months to move the crops of southern Louisiana, the railroads find it impossible to supply the number necessary to properly handle the business. It is believed that they make every effort, but it is manifestly impossible for them to keep on hand a large number of cars to be used from October to January only, and which will remain idle during the rest of the year. The result, however, is that all business during that period is more or less hampered by inability to obtain the requisite number of cars to handle the commerce.

11. The following list shows the recent experience of one of the large sawmills upon the Teche. The capacity of the mill was the same during October, November, and December as during the other months. The shipments were, however, limited by the inability of railroad companies to furnish cars:

	Cars.
January	104
February	121
March	151
April	127
May	131
June	121
July	93
August	108
September	95
October	52
November	57
December	55
January	107

12. Another illustration as to the manner in which shortage of cars retards development of the locality is shown by the experience of the salt mines at Weeks Island, near the Teche. During the year 1906 the output was 94,000 tons, and for 1907 the output was only 84,000 tons, the difference being due entirely to inability of the company to obtain necessary cars to ship any greater amount. It is estimated that with proper transportation facilities these mines would ship probably 200,000 tons per year.

13. The manner of the improvement of the Teche is one requiring careful study. The State levee boards have now under consideration the protection of the country between the Teche and the Atchafalaya. This can be done only by one of two methods, one being by a levee along the west bank of the Atchafalaya, the other and more expensive being by a levee along the south bank of the Courtableau and the west bank of the Atchafalaya below that stream. The first method would involve closing the mouth of the Courtableau and, of necessity, diverting its waters through the Teche. This has been under consideration by the State levee boards for some time, but no decision has yet been reached. It is, of course, understood that the consent of the United States is necessary to such action.

14. The character of the stream prevents any development of water power.

15. It is impossible at this time, and previous to a survey, to make any statements concerning terminal facilities.

16. The only other subject connected with the improvement of this stream is the treatment of Bayou Courtableau, a matter so intimately connected with the improvement of the Teche that the two must necessarily be considered together.

17. The present and prospective commerce of the Teche is of such an amount and of such value that it appears entitled to all the assistance which the General Government can render. The waterway appears highly worthy of improvement, and it is recommended that a survey, to determine the method and cost of such improvement, be made. As this survey will involve an examination of the basin of the Courtableau and a determination of the amount of water which would be turned from that stream into the Teche should connection be made between the two bayous, it is believed that the sum of $2,500 may be needed, and an allotment of this amount is requested.

Respectfully submitted.

LANSING H. BEACH,
Lieutenant Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., August 9, 1909.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. Bayou Teche is an important stream on which is carried an extensive and valuable commerce. It is now under improvement to St. Martinville under a project for the removal of obstructions, and the act of March 2, 1907, provided for the construction of a lock about 4 miles below St. Martinville to carry a slackwater depth of 6 feet to Arnaudville.

3. Navigation interests now desire a greater depth in the lower part of the bayou as far up as New Iberia. The district officer, who is also division engineer, believes this waterway worthy of improvement, and recommends that a survey be made to determine the method and cost of the improvement.

4. In the opinion of the board the commercial and navigation interests involved are sufficient to warrant a full investigation of their needs. It therefore concurs in recommending that a survey be authorized to determine the cost and advisability of further improvement. This stream is connected at its head with Bayou Courtableau, and it is understood that the district officer will give consideration to that stream in connection with his further report on Bayou Teche.

For the board:

D. W. LOCKWOOD,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Third indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, August 16, 1909.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Bayou Teche, La., authorized by the river and harbor act of March 3, 1909.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

FREDERIC V. ABBOT,
Acting Chief of Engineers.

[Fourth indorsement.]

WAR DEPARTMENT, *August 17, 1909.*

Approved.

JOHN C. SCHOFIELD,
Assistant and Chief Clerk
(For the Secretary of War in his absence).

REPORT ON SURVEY OF BAYOU TECHE, LA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New Orleans, La., June 10, 1911.

SIR: 1. I have to submit the following report of survey of Bayou Teche, La., being the continuation of the preliminary examination ordered by act of Congress dated March 3, 1909, with a view to securing increased depth in that stream. A survey was authorized by department letter of August 20, 1909, and the delay in reporting the result of the survey is due to an effort to adjust matters in connection with the improvement of Bayou Courtableau, the improvement of both streams being so intimately connected that the best plan for each involves work in the other. In this connection, attention is respectfully invited to the report of the survey of Bayou Courtableau submitted under this date.

2. Bayou Teche at the present time has a channel with an available depth of about 10 feet, at mean low tide, at its mouth; decreasing to about 7 feet at Franklin, 16 miles above its mouth; to about 6 feet at Jeanerette, 42 miles above the mouth; to about 5½ feet at New Iberia, 54 miles; and to about 4 feet at the lock site, 72 miles above the mouth. The available width of the 4-foot channel at the lock site is about 30 feet; of the 5½-foot channel at New Iberia, about 40 feet; of the 6-foot channel at Jeanerette, about 40 feet; of the 7-foot channel at Franklin, about 60 feet; and of the 10-foot channel at the mouth, about 75 feet.

3. The lock and dam now under construction at Keystone plantation will give a channel 6 feet in depth, with an available width of about 60 feet, from the lock site to Arnaudville, 106 miles above the mouth of the bayou. The surface of the pool formed by this lock and dam will be at an elevation of 8 feet above mean tide, and the pool surface will extend as far up as Leonville, 114 miles above the mouth of the Teche.

4. From this point to Bayou Courtableau, a distance of 10 miles, the bed of the Teche, at low water, consists of a series of pools separated by shoals, which are dry at low water, the highest point of the bed of the stream between Leonville and the Courtableau being 15.6 feet above mean tide and 5.6 feet above low water in the Courtableau, as the water in the latter stream is held at an elevation of 10 feet above mean tide by the bar which has formed just above its mouth. The Teche above Leonville has a minimum channel width of about 30 feet and the bed of the stream in many places is filled with a growth of brush and trees. The banks are high and average 20 feet above the bed of the stream.

5. The improvement of the Teche from its mouth to its head, due to the character of the stream and the nature of the improvements already begun, may be most advantageously considered in two parts, viz:

A—Improvement from mouth to New Iberia, 54 miles.
B—Improvement from New Iberia to head, 70 miles.

A—IMPROVEMENT FROM MOUTH TO NEW IBERIA, 54 MILES.

6. This portion of the Teche, according to reports, originally had an available depth of 8 feet and over at low water, but as the land along the stream began to be cultivated drainage ditches were led into it which carried in considerable sediment, and this, together with the wash of the banks by passing boats, has caused the bayou to shoal until its condition at present is as stated above.

7. This section of the Teche at the present time carries practically all of the commerce with which the stream is credited, the usual head of navigation being at St. Martinville, 3 miles above the lock site, although boats occasionally run to Breaux Bridge, 16 miles farther upstream.

8. The stream is lined with plantations, and there are numerous towns located on its banks, the principal ones being New Iberia, with

a population of 7,500; Jeanerette, with a population of 3,000; and Franklin, with a population of 3,000. These towns contain many sawmills which depend largely on the Teche for their supply of saw-logs, these being brought by water from the timberlands in the vicinity of Grand Lake. Numerous mills for grinding sugar cane are located on the bayou, and these receive the cane largely by water and ship much of their product in the same way, and a large amount of the oil which is used for fuel is delivered at these mills by water.

9. The commercial statistics for the calendar year 1909, which is the last year for which full returns have been received, but which differ but little from those for 1911, are as follows:

	Tons.	Value.		Tons.	Value.
SHIPMENTS.			RECEIPTS.		
Sugar	25,693	$2,318,870	Machinery	889	$88,900
Molasses	11,782	353,460	Fertilizers	200	4,000
Cotton and cottonseed products	4,028	87,900	Cooperage	120	20,400
Cord wood	6,145	18,435	Coal	3,850	15,400
Rice	1,785	71,400	Fuel oil	83,000	606,000
Junk	430	4,300	Cane	42,600	213,000
Brick	242	1,100	Logs	757,790	1,653,375
Lumber	2,828	28,280	Lime and cement	10	100
Machinery	67	6,240	Gravel and sand	2,500	5,000
Cane	43,600	178,000	Corn and oats	491	10,180
Shingles	75	1,500	Feed, ground	600	12,000
Potatoes	15	450	Brick	50	225
Crossties	1,200	5,000	Miscellaneous	7,935	793,500
Miscellaneous	1,200	120,000	Total receipts	900,035	3,422,080
Total shipments	99,090	3,189,435	Total shipments and receipts	999,125	6,611,515

10. The commerce in 1899 amounted to some 273,000 tons, and in the 10 years from 1899 to 1909 it will be seen that the tonnage has quadrupled. The commerce of the Teche for 1909 was carried on principally in the 54 miles below New Iberia, and, assuming an average haul of 27 miles, it will be seen that the ton-mileage for the past year can be fairly accurately given as 30,000,000 ton-miles. Commerce is carried on by means of stern-wheel steamboats and barges, the number engaged in the trade during 1909 being 32 steamboats and 89 barges. In addition, there are numerous gasoline boats carrying small cargoes of oysters, fish, etc., and making many trips up and down the stream, but as these boats are owned mainly by individuals who keep no records as to the business done, it has been impossible to incorporate the tonnage of freight carried by them in the statistics given above.

11. The annual value of water transportation on Bayou Teche in decreasing the cost of its principal products, lumber and sugar, is difficult to ascertain accurately, but is undoubtedly more than has thus far been expended by the United States in its improvement and maintenance, there having been expended to June 30, 1909, approximately, $100,000.

12. The larger portion of the commerce on the bayou may be considered as being purely local, but, with the opening of the Plaquemine route, a boat and barge line has been established between New Iberia and New Orleans and is now making one regular trip per week and is taxed to the full capacity of its present equipment. During the past season for the movement of sugar products there were three lines of

boats and as many other independent steamers plying between New Orleans and Teche points.

13. The difficulties attending navigation in this portion of the Teche are those due to its small cross section, which prevents barges from being loaded to their full capacity and the larger boats from making full speed, due to the small depth of water under their hulls. Stern-wheel steamboats with a length of 100 feet, a beam of 20 to 25 feet, and a draft of 3 feet can not make more than half speed in the bayou where a depth of 4 to 6 feet exists, due to the squatting of the boat as the water is driven back by the action of the wheel. Turning basins are also needed at various places along the bayou, particularly near the towns, so as to enable the larger boats to turn without difficulty.

14. Some relief from existing conditions is necessary, and a better and more easily navigated channel should be secured. In view of the present commerce and the prospective water-borne traffic from this section through the Morgan City-Plaquemine route to New Orleans, and to eastern ports by sea via the channel from the Atchafalaya River to the Gulf, it is believed that a channel of at least 8 feet in depth should be available from the mouth to New Iberia. This channel should have a bottom width of 100 feet with side slopes of 1/1, and turning basins not less than 200 feet wide and 400 feet long should be dredged at or near the towns of Franklin, Jeanerette, and New Iberia. The lock to be built on Bayou Teche will have a depth of 8 feet over the sills, and the pool formed by the lock and dam will give an 8-foot waterway for several miles above the lock site, but, owing to the smaller amount of traffic above New Iberia and the large amount of excavation involved, it is believed that a 6-foot channel with a bottom width of 60 feet and side slopes of 1/1 will be sufficient for some years to come above New Iberia. A turning basin 150 feet wide and 300 feet long at or near Loreauville, about 11 miles above New Iberia, should be provided. This width of channel will enable any two boats that can go through the lock, which will have a width of 36 feet, to pass in the bayou.

15. Such a channel will require dredging from a point one-half mile above the mouth of the bayou to the lock site, the estimated quantity of excavation being 3,677,000 cubic yards. If the depth of 8 feet were carried to Keystone Lock the excavation required would be 4,170,000 cubic yards.

16. A channel 10 feet deep from the mouth to New Iberia and 8 feet from New Iberia to the lock site would require the excavation of about 5,770,000 cubic yards.

17. A channel 15 feet deep from the mouth to New Iberia and 8 feet deep from New Iberia to the lock site would require a total excavation of approximately 12,500,000 cubic yards.

18. A channel 15 feet deep in the lower Teche is desired by certain interests along the bayou, on the ground that coasting schooners could then be brought up the stream to the mills and there loaded with lumber or other commodities for shipment to eastern ports. There is at present an outlet to the Gulf by way of the Atchafalaya River with an available depth of 14 feet, which is now being deepened by the United States to 20 feet. After the completion of this channel the draft of the larger vessels entering the port of Morgan City would

be too great to enable them to use a 15-foot channel in the Teche. While a 15-foot channel might benefit certain interests along the Teche, other interests gain but little, if any, by the increase in depth over an 8-foot channel, while the cost would be fully four times as great. A 15-foot channel would also be more difficult to maintain, as there would be an increased tendency of the banks to cave.

19. For these reasons a 15-foot channel in Bayou Teche is not considered worthy of construction by the United States.

20. For a 10-foot channel in the Teche below New Iberia the argument may be advanced that greater economy of transportation will result by enabling barges to be loaded that much deeper and also that, since the Morgan City-Plaquemine route to New Orleans has a depth of 10 feet at low water, the depth of the channel in the Teche should be the same.

21. The waterways of the Morgan City-Plaquemine route, however, except in Bayou Plaquemine, Bay Natchez, and Flat Lake, had a natural depth of 10 feet and over, and the dredging of about 2,000,000 cubic yards in this case over a distance of about 13 miles gave a 10-foot waterway about 80 miles long. In the Teche a 10-foot channel for 54 miles and an 8-foot channel for 18 miles farther will require dredging throughout the entire distance and the excavation of 5,770,000 cubic yards of material.

22. The benefit which would result to navigation by having a depth of 10 feet instead of 8 feet, while considerable, could be secured only at a disproportionate cost, for not only is the amount of excavation much greater, but on account of the increased difficulty of disposing of the material the deeper channel will cost more per cubic yard.

23. An 8-foot channel, as described above, from the mouth to New Iberia and 6 feet from there to the lock site is therefore believed to be all that should be undertaken by the United States at this time.

24. The material to be excavated consists of a fairly soft mud mixed in many places with a considerable quantity of trees, logs, bark, etc. The banks of the stream do not afford very favorable opportunities for disposing of the dredged material, in many cases being cultivated to the water's edge, but places generally exist on one bank—sometimes on one side, sometimes on the other, except in the towns—where dredged material can be deposited. It is believed that the people along the bayou, appreciating the importance of the work, will assist in every way possible.

25. The estimated cost of the dredging, due largely to lack of facilities for disposition of material, must be placed at 15 cents per cubic yard, which will make the cost of the 8-foot channel from the mouth to New Iberia as follows: Three million six hundred and seventy-seven thousand cubic yards, at $0.15, $551,550.

26. The expenditure of this sum by the United States is believed to be warranted by the benefits to be derived, though it is thought that its expenditure should be conditioned on local interests securing for the United States the land needed for turning basins and providing suitable dumping places along the banks of the bayou without charge to the Government; also that the towns of New Iberia, Jeanerette, and Franklin should guarantee the erection of suitable public landings or wharves, in order that the greatest amount of benefit can be secured from the proposed improvement.

B—IMPROVEMENT FROM NEW IBERIA TO HEAD, 70 MILES.

27. This section of the stream was formerly navigated during periods of high water when the water in Bayou Courtableau reached a sufficient elevation so as to flow down Bayou Teche.

28. Some work of improvement was carried on by the United States in 1885 and 1886 and consisted in the removal of trees, etc., from the bed of the bayou so as to benefit such navigation as existed during the high-water season.

29. As above indicated, it is at present under improvement by the United States by the construction of a lock and dam about 3 miles below the town of St. Martinville.

30. There is very little commerce on this section of the Teche at the present time and none whatever above Arnaudville, so that any improvement by the General Government must be based on the prospective commerce solely.

31. The banks of the Teche above the lock site, while not so thickly settled as those below, nevertheless support a large population and are extensively cultivated. The principal towns are St. Martinville, with a population of 2,500; Breaux Bridge, with a population of 1,700; Arnaudville, with a population of 800; and Leonville, with a population of 400.

32. Based on the prospective commerce of the Teche alone, the outlay necessary to carry navigation from Arnaudville to the head of the Teche would hardly be warranted at this time, but, considering that it will serve as an outlet to commerce on Bayou Courtableau and open up 82 miles of waterway now closed, it is believed that the extension of 6-foot navigation to the latter stream will be ultimately advisable.

33. The conditions on Bayou Courtableau are described in a report on that stream submitted on this date, to which attention is respectfully invited, and it is not believed necessary to repeat them here.

34. The plan of improvement for this section of the Teche was proposed in a report submitted December 26, 1905, and printed in House Document No. 527, Fifty-ninth Congress, first session.

35. In brief, that plan proposed the extension of 6-foot navigation to Bayou Courtableau by the construction of a lock and dam at Arnaudville with a lift of 10 feet and by the dredging of about 331,000 cubic yards of material in order to obtain a channel 60 feet wide and 6 feet deep in this pool.

36. This pool would be supplied by water from Bayou Courtableau, the low-water surface of this stream being held at an elevation of between 18 and 21 feet above mean tide by a dam below the head of the Teche.

37. The estimated cost of the above work in Bayou Teche and Courtableau is as follows:

(a) *For a lock and dam at Arnaudville with 8-foot lift, crest of dam at an elevation of 16 feet and the Bayou Courtableau Dam at 19 feet:*

Lock and dam at Arnaudville	$180,000
Movable dam in Bayou Courtableau	47,000
Clearing the Teche	5,000
Dredging Bayou Teche, 525,000 cubic yards, at 18 cents	94,500
Contingencies, about 10 per cent	32,650
Total	359,150

(*b*) *For a lock and dam at Arnaudville with 10-foot lift, crest of dam being at 18 feet above mean Gulf level and crest of Courtableau Dam 21 feet:*

Lock and dam at Arnaudville	$190,000
Movable dam in Bayou Courtableau	52,000
Clearing the Teche	5,000
Dredging Bayou Teche, 331,000 cubic yards, at 18 cents	59,580
Contingencies, about 10 per cent	30,670
Total	337,250

38. The above plan is considered the best and most economical that can be adopted for extending navigation to the Courtableau.

39. To attempt to extend 6-foot navigation by dredging alone from Arnaudville to the Courtableau would involve the excavation of some 2,500,000 cubic yards of material and the construction of a lock at the Courtableau to hold up the pool of that stream and to regulate the flow into the Teche.

40. The above plan, if adopted, will, with the dam in the Courtableau, extend 6-foot navigation from Arnaudville to Washington on the Courtableau, and to a considerable distance up Bayous Cocodrie and Boeuf, and not only give water transportation to people on the upper Teche, but, also, afford an outlet for the commerce of the country bordering the Courtableau.

41. Incidentally, the flow of fresh water from the Courtableau down the Teche will give a good current in the latter stream which will be beneficial not only for its maintenance but also in that it will sweep out of the bayou the impurities which necessarily enter it, particularly at the towns, and which, owing to its sluggish current or at times absence of current, are not at present removed.

42. The incidental question of land reclamation is of great importance, and the value of the lands which could be drained and secured from overflow by the adoption of the plan would be many times the amount of the cost involved, while the area would amount to some millions of acres. Another very important feature of the improvement would be its effect upon Bayou Teche. That stream is now practically a tide-level waterway and has current only after times of considerable rainfall. The intercoastal canal will soon cut across the country to the west of the Teche, and on account of the intersected bayous which connect with Cote Blanche Bay the salt water of the Gulf of Mexico will flow in flood tides into the Teche and seriously interfere with the raising of rice and the use of water in the boilers of the manufacturing plants and mills along the stream. This trouble has already occurred in the vicinity of Franklin, owing to the Hanson Canal a few miles below that town. The owners of the canal have kept their lock closed as much as possible in order to avoid the inflow of salt water, but even under these circumstances some of the mills at Franklin have had to close down at times on account of the foaming in the boilers. The sanitary condition of the water is extremely bad, so bad that at times stock have been killed by drinking it. A steady flow of water from the Courtableau would avoid all these inconveniences and would materially assist in improving the sanitary condition in the entire country along the banks of the Teche. It should be stated that any plan involving the junction of Bayou Courtableau and the Teche has met with considerable opposition from some people on the former stream. The people on the lower Teche have

no hesitancy in stating that this opposition is largely due to commercial rivalry. There is also no question that a large part of the opposition comes, at least, indirectly, from the Union Rice & Irrigation Co. This company has a very extensive pumping plant located at Washington, and contemplates, according to the map issued by it, to extend its canals practically throughout the entire region lying between Vermilion and Calcasieu Rivers as far south as the intercoastal canal. This office had at one time practically decided to submit an adverse recommendation concerning the improvement on account of this opposition. Recent developments have, however, shown that there is a strong sentiment in favor of the improvement, and while the Government is not in position to expend money for improving waterways where the people do not desire the work to be done, the latest information is to the effect that a majority of the people are in favor of the improvement.

43. Considering the value of the land between the Teche and the Atchafalaya which can be reclaimed if this plan is adopted, the improvement which will follow in portions of Bayous Cocodrie and Boeuf, the great betterment of sanitary conditions along the Teche, and the commercial benefits to both the Courtableau and upper Teche, it is believed that the opposition of parties to the improvement should not be allowed to prevail. The locality is, therefore, regarded as worthy of improvement, and it is recommended that the improvement be made in accordance with the plan indicated, of a movable dam in Bayou Courtableau and a lock and dam in the Teche at Arnaudville.

Respectfully submitted.

LANSING H. BEACH,
Lieutenant Colonel, Corps of Engineers.

[For report of Board of Engineers for Rivers and Harbors on survey, see p. 3.]

SUPPLEMENTAL REPORT ON SURVEY OF BAYOU TECHE, LA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New Orleans, La., April 27, 1912.

SIR: I have to respectfully submit the following report of survey of Bayou Teche, La., being supplemental to the report of June 10, 1911, upon this subject. A supplementary report is also submitted under this date concerning the survey of Bayou Courtableau, the improvement of that stream and of the upper Teche being so intimately connected that they must be considered together.

2. In the report upon the Courtableau it is stated that conditions have changed since the submission of the former report. All opposition to the improvement has been withdrawn, permission has been granted to the State board of engineers for the Atchafalaya Basin, and the Red River, Atchafalaya and Bayou Boeuf Levee districts to build a levee across the mouth of Bayou Courtableau, and the levee boards and State engineers expect to provide drainage outlets by way of Big Bayou Fordoche and Bayou Teche. The plans of the State board of engineers for Bayou Teche have not yet been completed and, owing to the present flood stage of the Mississippi, the State authori-

ties concerned will be unable to give any attention to the matter for probably some months to come. Under these circumstances, it has been considered preferable to forward the report with statement of conditions to date rather than to await development of plans to be adopted.

3. The members of the State board of engineers say informally that the establishment of a drainage outlet from Bayou Courtableau through Bayou Teche involves the adoption either of a plan similar to that recommended in the report of this office of June 10, or one of more extensive dredging so as to provide a full channel without a lock at Arnaudville, or dam at Port Barre. In any case, the work will have to be in line with the improvement for the upper Teche already recommended by this office.

4. This work by the State authorities will amount to a substantial cooperation with the United States in undertaking the work, and the recommendation previously made is, therefore, modified to recommend the improvement of the Teche between Arnaudville and Bayou Courtableau, the details of the method and the manner of doing the work to be determined by the Chief of Engineers and Secretary of War, after due consideration of the plans which will be presented by the Louisiana authorities and the extent of their cooperation determined.

5. With regard to that portion of the Teche below New Iberia, its large traffic and bad condition urgently call for its improvement by dredging so as to provide a minimum channel of 8 feet in depth, with 100 feet bottom width. This is considered as necessary to accomodate the commerce now upon the stream, which commerce would be, it is believed, materially increased by the establishment of that channel. It is well known that the commerce of both New Iberia and Jeanerette has suffered materially, and that in many cases business has experienced delay and loss on account of the shallow water.

6. The commerce of the Teche for 1910–11 shows practically the same results as for 1909, given in the report of June 10, and is as follows:

	Tons.	Value.
1910	857,804	$6,890,203
1911	1,016,116	6,581,700

There are operating regularly on the Teche six different lines of steamers as follows:

Bradford Transportation Co. (two steamboats).
Steamer *Ben Hur*.
Southern Pacific Co. (two barge lines—one from Morgan City, one from Baton Rouge).
Steamer *B. A. Boyle* and barges.
Barbour Line (four steamboats and barges).

There were until recently seven, one line having been discontinued, owing to the destruction of the steamer *Trudeau* by fire.

In addition to these there are some 25 other boats operating upon the bayou but not upon schedule.

7. Practically all this commerce may be considered as existing between New Iberia and the mouth, the proportion above New

Iberia being very small, there being no regular lines plying as yet above that point.

8. Cross sections,[1] which may be regarded as typical of this stream at the different points, are appended hereto, showing that great difficulty must be encountered, especially in the upper reaches, due to the narrow width of channel and the sloping bottom. These conditions leave scant width for boats in passing and greatly obstruct navigation on account of the suction, boats being unable to make the same speed that they could if the water were deeper. A glance at these cross sections, upon which is shown the channel recommended, will show the improvements which will result if the channel recommended is adopted.

9. The recommendation made in the report of June 10, 1911, is therefore repeated, as it is believed that, unless a channel at least 8 feet in depth with a bottom width of 100 feet is provided, the waterway will gradually lose a large portion of the commerce which it now possesses, while the construction of such a channel will lead to a material increase in the traffic.

Very respectfully,
LANSING H. BEACH,
Lieutenant Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

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[1] Not printed.

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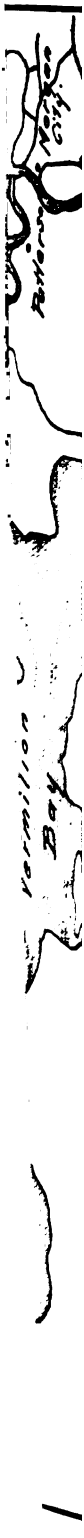
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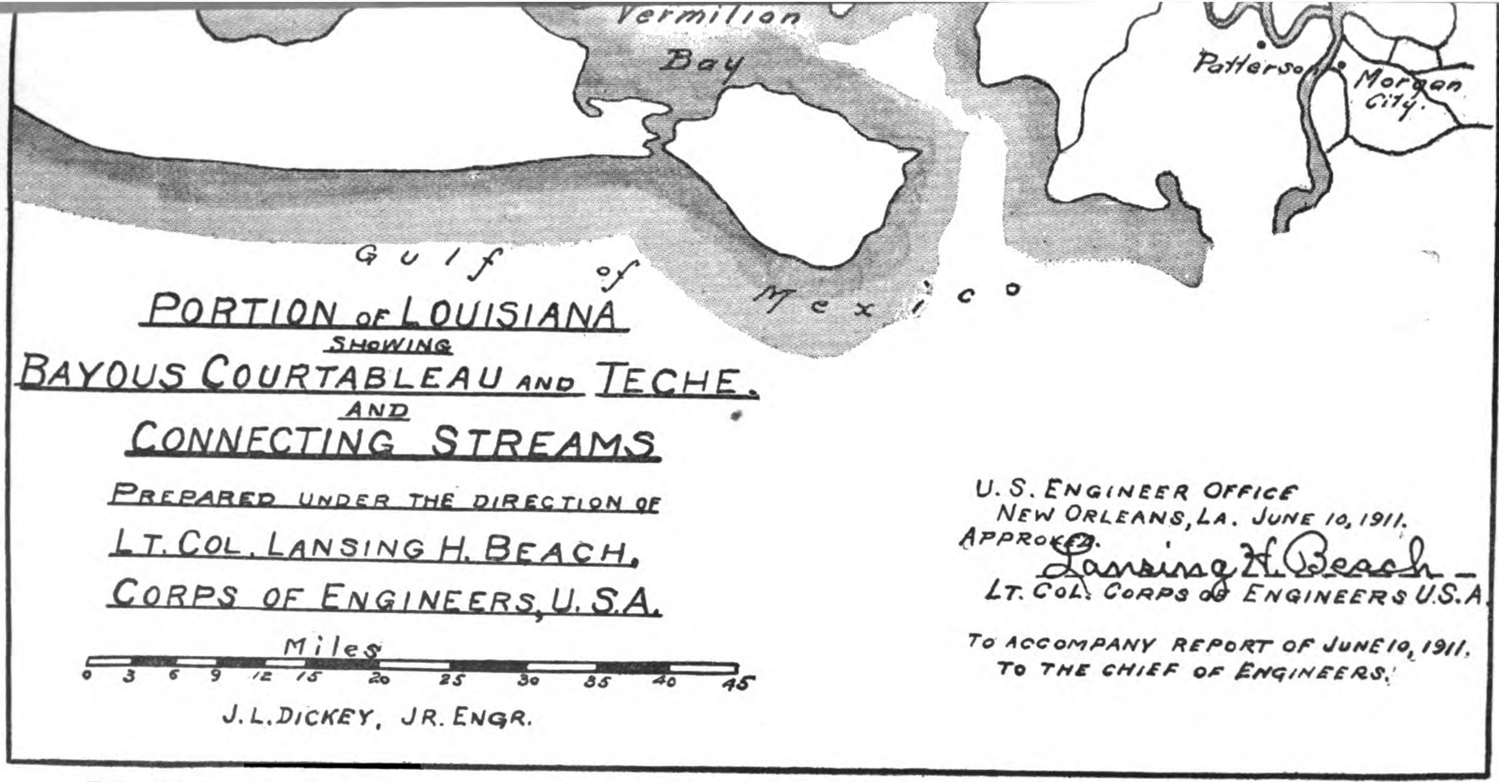


PORTION OF LOUISIANA
SHOWING
BAYOUS COURTABLEAU AND TECHE.
AND
CONNECTING STREAMS

PREPARED UNDER THE DIRECTION OF
LT. COL. LANSING H. BEACH,
CORPS OF ENGINEERS, U.S.A.

J. L. DICKEY, JR. ENGR.

U.S. ENGINEER OFFICE
NEW ORLEANS, LA. JUNE 10, 1911.
APPROVED.
Lansing H. Beach
LT. COL. CORPS OF ENGINEERS U.S.A.

TO ACCOMPANY REPORT OF JUNE 10, 1911.
TO THE CHIEF OF ENGINEERS.

H. Doc. 1329, 62-3. (To follow page 19.)

62D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1330.

KAHULUI HARBOR, HAWAII.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON ADVISABILITY OF PROVIDING FOR THE WEST BREAKWATER AT KAHULUI HARBOR, HAWAII.

FEBRUARY 1, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, January 31, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 30th ultimo, together with copy of a report from Maj. W. P. Wooten, Corps of Engineers, dated November 18, 1912, with map, on Kahului Harbor, Hawaii, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 30, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on Kahului Harbor, Hawaii.

1. There is submitted herewith, for transmission to Congress, report dated November 18, 1912, with map, by Maj. W. P. Wooten, Corps of Engineers, rendered pursuant to the following provision of the river and harbor act approved July 25, 1912, relating to Kahului Harbor, Hawaii:

> That the Secretary of War is authorized and directed to report to Congress as to the advisability of providing for the west breakwater referred to under project numbered two in House Document numbered five hundred and ninety-three, Sixty-first Congress, second session.

2. The approved project for the improvement of Kahului Harbor provides for extending to American Girl Rock the breakwater originally constructed by the Kahului Railroad Co. and for dredging certain areas to a depth of 35 feet. Work on the project is well advanced, and large vessels are utilizing the protection afforded from northeast trade winds. It appears, however, that the harbor is seriously affected at times by northern seas, from which there is no protection. Moreover, it is found that the littoral current brings into the harbor and deposits in the basin large quantities of material, which would have to be removed by dredging from time to time, at considerable cost, in order to keep the project depth available. The district officer states that a breakwater from the west bank would prevent the littoral current entering the harbor, and would, therefore, stop the deposit of material. The cost of such a breakwater is estimated at $250,000, and in the opinion of the district officer this cost is more than counterbalanced by the saving in dredging which it will effect. The division engineer concurs with the district officer in recommending the improvement.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 23, 1912, concurring in the views of the district officer.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Kahului Harbor, Hawaii, by the construction of a west breakwater is deemed advisable, following in general the methods described in the report of the district officer, at an estimated cost of $250,000, this estimate being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $100,000, with contract authorization for completion of the work.

5. Attention is invited to the facts as shown in the reports of the district officer and division engineer that the value of this western breakwater and of Kahului Harbor will be later much increased whenever the eastern breakwater shall be further extended (to a point near K on the appended map).

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 23, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The item of law making appropriation for Kahului Harbor, contained in the act of July 25, 1912, provides—

> That the Secretary of War is authorized and directed to report to Congress as to the advisability of providing for the west breakwater referred to under project numbered two in House Document numbered five hundred and ninety-three, Sixty-first Congress, second session.

2. A description of and reference to the possible need of a west breakwater may be found on page 17 of the document just mentioned. It is there stated that—

> The construction of this western breakwater to "M" and the extension of the eastern breakwater to "K" will leave a harbor entrance 1,100 feet wide, through which alone waves and wave energy can enter the harbor. The wide area within this entrance and the long shoal foreshores would act as a large stilling basin in which the wave energy would be rapidly reduced. The western breakwater will, in addition, offer the advantage of stopping entirely, or at least greatly retarding, the drift of sand into the harbor southward along the west shore.

The cost of the breakwater was then estimated at $228,000.

3. The district officer reports that the partially constructed breakwater has greatly facilitated the handling of freight, and greater protection is expected through the completion of the dredging provided for by the existing project. He finds that the harbor is subject to considerable shoaling, the cause of which he traces to sediment from the Iao River carried into the harbor by the littoral currents. He estimates the amount of shoaling at 33,000 cubic yards per annum, that it will cost at least $15,000 to remove it, and that it seems possible that if the harbor is enlarged the cost of maintenance will be increased. He states that a breakwater as proposed would prevent the littoral current entering the harbor, and would therefore check the deposit of material therein. He estimates the cost of the breakwater, including engineering, inspection, and contingencies, at $250,000.

4. The district officer believes that the saving in dredging effected by the breakwater will be more than sufficient to justify its cost. He therefore recommends the improvement as advisable, and the division engineer concurs.

5. From the facts presented it appears that the construction of the west breakwater would be of some benefit in reducing wave action in the harbor and would be of material advantage in reducing the cost of maintenance. The board therefore concurs with the district officer and the division engineer and reports that, in its opinion, it is advisable for the General Government to undertake the construction of the west breakwater as proposed at an estimated cost of $250,000. It recommends a first appropriation of $100,000, with contract authorization for the balance as proposed by the district officer.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT ON ADVISABILITY OF PROVIDING FOR THE WEST BREAKWATER AT KAHULUI HARBOR, HAWAII.

UNITED STATES ENGINEER OFFICE,
Honolulu, Hawaii, November 18, 1912.

From: Maj. W. P. Wooten, Corps of Engineers.
To: The Chief of Engineers
(Through the Division Engineer).
Subject: Report on advisability of providing for the west breakwater at Kahului Harbor, Hawaii.

1. The river and harbor act of July 25, 1912, provided—

> That the Secretary of War is authorized and directed to report to Congress as to the advisability of providing for the west breakwater referred to under project numbered two in House Document numbered five hundred and ninety-three, Sixty-first Congress, second session.

2. The project under which work at this harbor is now being carried on was adopted by Congress in the river and harbor act of June 25, 1910. This project involves the extension of the east breakwater to American Girl Rock, and dredging a basin in the lee of the breakwater, as shown on the map herewith. This project will probably be completed before the end of the present fiscal year.

3. The breakwater as already constructed has greatly facilitated the handling of freight, as the trans-Pacific steamers now anchor in the lee of the breakwater, where they receive considerable protection from the northeast trade winds which usually prevail, and which, in this locality, are decidedly strong. As soon as the dredging is completed, the protection afforded by the breakwater can be utilized to a much greater extent than at present, as the vessels can approach nearer shore, where they will be more completely in the lee of the breakwater.

4. The severest storms, locally termed "konas," are from the south. No artificial protection against these storms is needed, since, at this point, they blow from the shore. The harbor is, however, seriously affected at times by northern seas which enter as huge rollers, and which may be accompanied by high winds, though not necessarily so. The harbor has no protection from these seas.

5. The only stream of any consequence flowing into the sea in the vicinity of the harbor is the Iao, which enters from the west shore about 2,000 yards north of the harbor. The banks of this stream near its mouth are composed of sand, and are high and unstable. During the greater part of the year, this stream is practically dry, the upper waters being conserved for irrigation. It therefore ordinarily carries no sediment. During freshets, however, the sandy banks are undermined, and a great deal of material is carried into the sea, causing a discoloration of the water for some distance from the mouth.

6. The littoral current is probably caused by the prevailing winds, which impinge against the shore at such an angle as to produce a strong flow from the north along the west shore into the harbor. The current then swings to the east along the south shore, and is finally deflected from the shore near the main wharf to the deep harbor basin, where it loses its velocity and makes deposits. The strength of this current is evidenced by the fact that vessels at anchor in the harbor headed to the northeast trades require a stern mooring line shoreward, to prevent being swung seaward by the current against the strong opposing winds. The general trend of the current is

strikingly evident when the Iao stream is in freshet. At such times the discolored water is seen to take exactly the course above described.

7. The littoral current evidently brings into the harbor and deposits there the sediment brought into the sea by the Iao stream, and such other material as it may pick up along the shore. The first survey of the harbor made by this department was made in 1909, and a comparison with a survey just completed shows that in the past three years approximately 100,000 cubic yards of material has been deposited over the area now being dredged. This means an annual average fill of about 33,000 cubic yards. It may reasonably be expected that after the dredging is completed, the annual fill will be increased rather than diminished, since the natural tendency in a sandy bottom is to obliterate changes. At the prices for dredging which at present obtain in this district, it can not be expected that work can be done at Kahului for less than about 45 cents per cubic yard. The maintenance of the present harbor by dredging will therefore cost at least $15,000 annually, and if, as seems probable, it is found necessary to increase the capacity of this harbor in the near future, the cost of maintenance is likely to be much higher.

8. A breakwater from the west bank, as proposed in the project under consideration, would prevent the littoral current entering the harbor, and would therefore stop the deposit of material in the harbor. The material carried would probably be deposited on the sea side or weather angle between the breakwater and shore. The basin now being dredged, and any possible future extension thereof, would then be protected against deposits and the expense of periodic dredging practically eliminated.

9. The amount of stone required for the breakwater has been estimated at 120,000 tons. The east breakwater now being constructed is costing $1.75 per ton in place. Assuming the same unit price for the west breakwater, we have the following estimate of cost:

120,000 tons of stone, at $1.75	$210,000
Engineering, inspection, and contingencies	40,000
	250,000

If this amount were capitalized at 4 per cent, the interest would be $10,000 per annum. The saving in dredging effected by the breakwater will much more than counterbalance this. For this reason, if for no other, the construction of the breakwater is recommended.

10. If the breakwater is constructed as recommended, the entrance between the ends of the two breakwaters will be 1,650 feet wide. This entrance is too wide for the harbor to have any great effect as a stilling basin, and the west breakwater will afford very little increased protection to shipping unless the east breakwater is extended to the point "K," the advisability of which extension is not now under consideration.

11. If the construction of the breakwater is authorized as recommended, the first appropriation should be for $100,000, with authority to enter into contract for the expenditure of the remaining $150,000, so that one contract can be made for the entire work.

12. The construction of this breakwater can not be coordinated with the development and utilization of water power or other matters so as to reduce the cost of construction.

W. P. WOOTEN.

[First indorsement.]

UNITED STATES ENGINEER OFFICE, PACIFIC DIVISION,
San Francisco, Cal., November 27, 1912.

To the CHIEF OF ENGINEERS:

1. The division engineer concurs in the views expressed by the district engineer and considers the construction of the western breakwater advisable.

2. The best results will not be attained in the improvement of this harbor without the further extension of the eastern breakwater to the point marked "K," as shown on the tracing.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see page 2.]

O

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1336.

VERMILION RIVER, LA., AND CHANNEL TO CONNECT WITH INLAND WATERWAY.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF VERMILION RIVER, LA., AND CHANNEL TO CONNECT VERMILION RIVER WITH THE INLAND WATERWAY BETWEEN FRANKLIN AND MERMENTAU AT SCHOONER BAYOU.

FEBRUARY 3, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, February 3, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 1st instant, together with copies of reports from Maj. Edward H. Schulz, Corps of Engineers, dated December 10, 1912, and January 18, 1913, on preliminary examination, with maps, and estimate of cost of improvement, respectively, of Vermilion River, La., and channel to connect Vermilion River with the inland waterway between Franklin and Mermentau at Schooner Bayou, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

War Department,
Office of the Chief of Engineers,
Washington, February 1, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and estimate of cost of improvement of Vermilion River, La., and channel to connect with inland waterway.

1. There are submitted herewith, for transmission to Congress, reports dated December 10, 1912, and January 18, 1913, by Maj. Edward H. Schulz, Corps of Engineers, on preliminary examination, with maps, and estimate of cost, of improvement, respectively, of Vermilion River, La., and channel to connect Vermilion River with the inland waterway between Franklin and Mermentau at Schooner Bayou, called for by the river and harbor act approved July 25, 1912.

2. The existing project for improvement of the channel, bay, and passes of Vermilion River, or Bayou Vermilion, provides for a channel 5½ feet deep at low water (mean low Gulf level) from the mouth to the railroad bridge just below Lafayette, by removing obstructions and by dredging through the shoals. Under this project a channel of 6 feet depth was dredged through the bar in 1910, but this channel shoaled rapidly, so that the present depth is not more than 3 to 3½ feet. The district officer reports that about 95 per cent of the commerce that uses Bayou Vermilion comes from the west through Mermentau River and the inland waterway to the mouth of Schooner Bayou, then crosses the open waters of Vermilion Bay and enters the mouth of Bayou Vermilion. The danger of the open waters and the shallowness of the water in West Vermilion Bay have rendered unprofitable previous attempts to run boats from New Orleans to Abbeville, and it appears that local commerce is greatly reduced and hampered by the unsatisfactory navigation conditions.

3. The adopted project for the inland waterway from Franklin to Mermentau provides for a depth of 5 feet. On account of the exposure, shallow water, and unfavorable experience in maintaining a channel in Vermilion Bay, a change of route of this waterway to the north of the bay is under consideration, and if adopted would form a logical easterly extension of the cut now proposed to connect Schooner Bayou and Vermilion River. The district officer states that this cut appears to be one of the most important portions of the entire intracoastal waterway, and he recommends that it be dredged by the United States on the route A–B′, indicated on the accompanying map, to a depth of 5 feet below mean Gulf level and a bottom width of 40 feet, at an estimated cost of $37,500, provided that the necessary right of way, 300 feet wide, be donated to the United States free of cost. The division engineer concurs in the views of the district officer.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 27, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and, therefore, in carrying out the instructions of Congress, I report as

follows: That the improvement by the United States of Vermilion River, La., and channel to connect Vermilion River with the inland waterway between Franklin and Mermentau at Schooner Bayou is deemed advisable so far as to secure a channel depth of 5 feet and a channel width of 40 feet, increased at entrances and on curves, and subject to the condition specified by him, at an estimated cost of $37,500 for first construction, and $1,800 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON PLAN AND ESTIMATE OF COST OF IMPROVEMENT.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 27, 1913.

To the Chief of Engineers, United States Army:

1. Vermilion River or Bayou is under improvement by the United States, the present project providing for the removal of snags and overhanging trees to the head of navigation at Lafayette, 52 miles, and dredging at the mouth in Vermilion Bay.

2. The depth in the river is about 4 feet to 20 feet at low water, there being a good navigable depth below Abbeville, 22 miles, except on the bar at the mouth, where the depth is but 3 to 3½ feet, although a channel 6 feet in depth was dredged through this bar in 1910.

3. The commerce of the river for 1911 is reported to be 29,151 tons of a miscellaneous character. About 95 per cent of this commerce comes from the west through the inland waterway and Schooner Bayou, and then crosses the open waters of Vermilion Bay to the mouth of the river. This crossing is hazardous on account of exposure and shallow water, and the necessity of making it retards the development of commerce between the Vermilion and the country to the west.

4. The improvement contemplated is a cut or canal, similar in dimensions to the connecting inland waterway, from a point on Vermilion River about 1¾ miles above its mouth to Schooner Bayou. The present available route for the inland waterway east of Schooner Bayou is through Vermilion Bay. On account of the exposure, shallow water, and unfavorable experience in maintaining a channel in the bay, a change of route to the north of the bay is under consideration, and if adopted would form a logical extension of the cut now proposed to connect Schooner Bayou and Vermilion River.

5. The district officer presents alternate estimates for routes A–B and A–B′, as shown on the map accompanying, for channels 5 feet deep at mean low Gulf level and 40 feet bottom width, the amounts being $33,000 and $37,500, respectively. The estimate for maintenance of either route is $1,800. As the route A–B′ will eliminate a bad bend in Vermilion River, and for other reasons given, the district

officer recommends that route, with the proviso that the right of way 300 feet wide be donated to the United States free of cost. The division engineer concurs in the views of the district officer.

6. It appears that the cut or canal proposed by the district officer will afford a safer and more reliable channel than the present exposed route, that it would give confidence to navigation interests, and would stimulate and encourage the development of commerce through the connecting inland waterway. For these reasons the board believes the improvement desirable, and it reports that in its opinion it is advisable for the United States to undertake the work in accordance with the estimate for route A–B′ at a cost of $37,500 for first construction and $1,800 thereafter for maintenance, provided the necessary right of way is furnished without cost to the United States. The initial appropriation should cover the whole amount of the estimate.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interest of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF VERMILION RIVER, LA., AND CHANNEL TO CONNECT WITH INLAND WATERWAY.

War Department,
United States Engineer Office,
New Orleans, La., December 10, 1912.

From: District engineer officer.
To: Chief of Engineers, United States Army (through Division Engineer, Gulf Division).
Subject: Preliminary examination of Vermilion River and channel to connect with inland waterway.

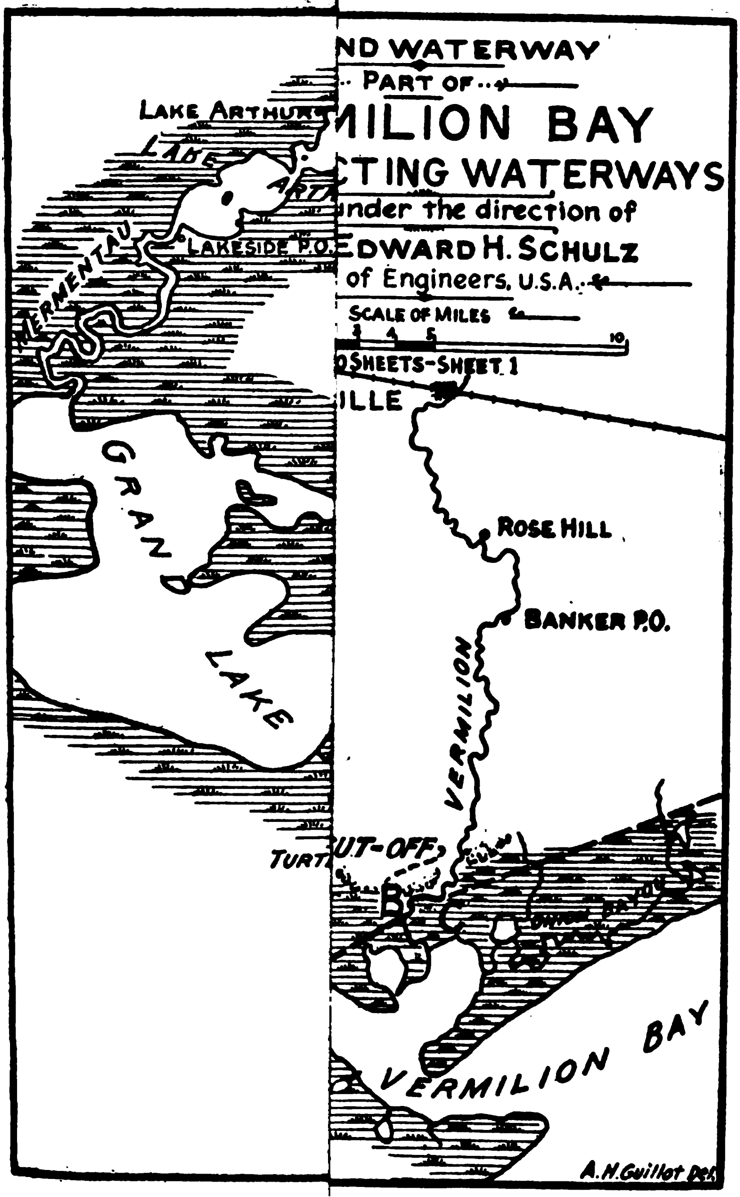
1. The following report on preliminary examination of Vermilion River, La., and channel to connect Vermilion River with the inland waterway between Franklin and Mermentau at Schooner Bayou is submitted under the provisions of the river and harbor act of July 25, 1912, and in compliance with department instructions of August 3, 1912. An examination was made on September 19–20, 1912.

2. Two maps are submitted herewith. Sheet 1 shows the general location of Vermilion River from Abbeville to the bay and its relation to the inland waterway. Sheet 2 shows the mouth of Vermilion Bayou and the bay more in detail.

3. Bayou Vermilion, or Vermilion River, is the first stream in southern Louisiana west of and not connected with the Atchafalaya River. It starts from the junction of Bayou Barbeux and Bayou Fusilier, and by the Fusilier it is connected with the Teche. The river flows through a slightly rolling prairie country. It is considered navigable to Lafayette, 52 miles above its mouth, where it is crossed by the fixed bridge of the Morgan's Louisiana & Texas Railroad.

H. Doc. 1336, 62-3. (To face page 4.) No. 1.

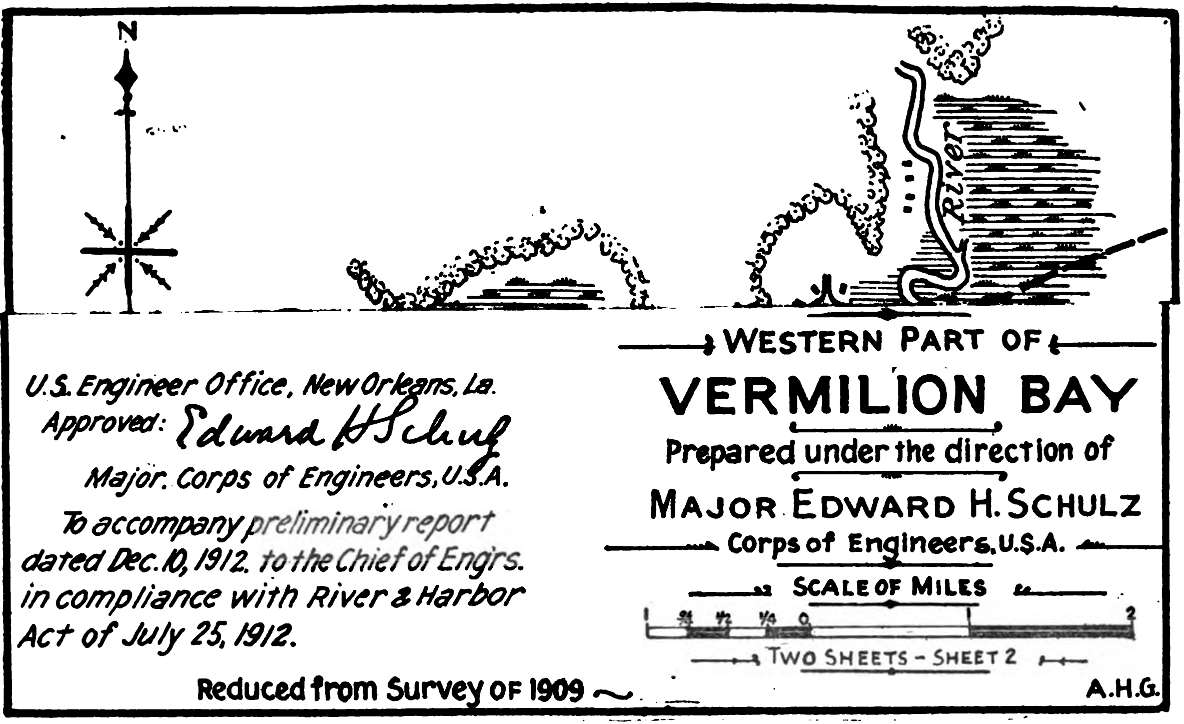
WAR DEPARTMENT RPS OF ENGINEERS, U.S.A



Connecting Waterways

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.A.



WESTERN PART OF

VERMILION BAY

Prepared under the direction of

MAJOR EDWARD H. SCHULZ

Corps of Engineers, U.S.A.

SCALE OF MILES

TWO SHEETS - SHEET 2

A.H.G.

U.S. Engineer Office, New Orleans, La.
Approved: Edward H. Schulz
Major. Corps of Engineers, U.S.A.

To accompany preliminary report
dated Dec. 10, 1912. to the Chief of Engrs.
in compliance with River & Harbor
Act of July 25, 1912.

Reduced from Survey of 1909

H. Doc. 1336, 62–3. (To face page 4.) No. 2.

Three miles below is the Pin Hook Bridge (wagon drawbridge). At Abbeville, 22 miles above its mouth, is a railroad bridge with draw. The banks for 45 miles below Lafayette are of red, clayey soil, above all overflow, except strips of marsh occasionally found from 50 to 100 feet in width. Trees grow upon the banks for a width of about a hundred feet and are the only timber near. The remaining 7 miles to the mouth is sea marsh, covered at high tides. The width of the bayou varies from 50 to 400 feet, and the depth from 4 to 20 feet at low water, there being ample water below Abbeville except at the bar. The river empties into the western end of Vermilion Bay through two outlets, known as "The Passes," one of which (the eastern) has in former years been partly closed by a brush jetty. The usual variation of the tide at the mouth is about 1 foot. There is, however, a variation as much as 2 feet above and below mean water due to wind. A depth of about 2 feet existed over the bar before improvement.

4. The river is now under improvement according to the project adopted in 1880, which was modified in 1892. The present operations consist in removal of snags and overhanging trees to the head of navigation at Lafayette and dredging at the mouth. In 1910 a channel of 6 feet depth was dredged through this bar and marked with piles. This channel, however, shoals very rapidly, so that the present depth is not more than 3 to 3½ feet.

5. *Previous examinations.*—Previous reports and examinations of Bayou Vermilion will be found as follows:

Annual report of Chief of Engineers, United States Army, for 1880, page 1164: This report contains the first project under which work was done, as outlined above. The work consisted of snagging. dredging, and jetty construction, at a total estimate of $9,900.

Annual report of Chief of Engineers, United States Army, for 1887, page 1398: Estimates cost of additional improvement from Abbeville to the Morgan's Louisiana & Texas Railroad bridge at Lafayette. Report unfavorable.

Annual report of Chief of Engineers, United States Army, for 1891, page 1855: Provides for depth of 5½ feet to Lafayette (Pin Hook Bridge), at a cost of $25,000. This is the modification of project referred to above.

House Document No. 1218, Sixtieth Congress, second session, report of August 10, 1908: Contains project for affording 5½ feet draft to Abbeville and 3 feet draft to Lafayette, at a cost of $22,660, and annual maintenance of $3,000. Congress has so far taken no action on this report.

6. *Commerce.*—The commerce on Bayou Vermilion for the year 1911 was 29,151 tons, which has been about the average for the last 10 years. The details of the 1911 commerce are as follows:

Vessel classification.

Classes.	Number.	Net registered tonnage.
AMERICAN.		
Registered:		
Steamers	2	11,460
Gas boats	5	3,320
Sailing	3	1,500
Unregistered:		
Gas boats	41	....
Sailing	7	....
Unrigged (barges)	14	....
Total	72	16,280

Freight traffic.

Articles.	Customary units.		Amount in short tons.	Valuation.	Average haul distance freight was carried.	Ton-mile statistics.	Rate per ton-mile.
	Amount.	Unit.					
Cane	24,000	Tons	24,000	$108,000	25	600,000	$0.012
Rice	800	Sacks	80	3,200	30	2,400	.05
Cotton	1,100	Bales	275	55,000	25	6,875	.104
Cotton seed	1,100	Sacks	33	990	25	725	.073
Sugar	600	Barrels	120	12,000	25	3,000	.05
Molasses	100	...do	25	1,000	25	625	.08
Wood	200	Cords	200	800	25	5,000	.016
Live stock	500	Head	150	10,000	50	7,500	.069
Hides and furs	3,200	....	65	14,375	60	3,900	....
Moss	40	Bales	6	240	30	180	.05
Poultry and eggs	9	Tons	9	2,750	25	225	.18
Sand and shells	190	...do	190	380	50	9,500	.035
Brick	80,000	....	180	720	25	4,500	.035
Lime and cement	275	Barrels	35	387	25	925	.080
Fuel oil	13,615	...do	2,110	14,770	20	42,200	.032
Refined oil	100	...do	20	400	25	500	.096
Lumber	250,000	Feet	500	5,000	25	12,500	.04
Shingles	90,000	....	18	450	25	450	.08
Coal	450	Tons	450	2,700	60	27,000	.026
Fertilizers	100	...do	100	3,400	10	1,000	.10
Manufactured iron and steel	30	...do	30	3,000	15	450	.266
Feed, ground	500	Sacks	13	1,350	25	325	.08
Oysters	400	Barrels	20	500	60	1,200	.133
Potatoes	250	...do	22	880	25	550	.068
Miscellaneous	500	Tons	500	50,000	25	12,500	....
Total	....	....	29,151	292,292	....	744,030	....

7. Mr. D. L. McPherson, of Abbeville, La., who is interested in this improvement, states to this office as follows:

> Relative to yours of the 19th referring to improvement of the mouth of the Vermilion River, beg to advise that the proposed short cut would be used entirely by all boats and commerce from the west to the Vermilion River or from the Vermilion River west. None of the western traffic would use the Vermilion Bay to reach the Vermilion River if the cut-off was made. At present the inadequate depth of the water in the Vermilion Bay from the mouth of the Vermilion River to Schooner Bayou deters the larger boats in the trade west of the Vermilion from extending their operation to the Vermilion River. During the fall and winter months none but very shallow draft boats can cross the western arm of the Vermilion Bay from the mouth of the Vermilion River to Schooner Bayou. At present several boats that were in the trade regularly between Grand Chienier, Leesburg, Lake Arthur, Lake Charles, and Pecan Island to Abbeville through the intercoastal canal have been forced to discontinue their trips on account of insufficient water depth in the Vermilion Bay to navigate. Without the cut-off connecting the Vermilion River with Schooner Bayou the intercoastal canal west is practically useless. To attempt to

open and keep open a channel through the Vermilion Bay from the Vermilion to Schooner Bayou would cost several times more than the cost of cutting the short cut connecting the two waterways.

I should say that from 50 to 75 boats pass in and out of the Vermilion River and through the intercoastal canal at present, some carrying freight, others pleasure craft. I am unable to state the number that would use the intercoastal were sufficient water provided from the west that they could reach the Vermilion at all times. The water depth is so inadequate across the Vermilion Bay that the Post Office Department directs the mail from Pecan Island carried to Lake Arthur, La., in Calcasieu Parish, a longer haul, rather than risk having the mails tied up by low water in the Vermilion Bay.

8. About 95 per cent of the commerce that uses Bayou Vermilion comes from the west through Mermentau River and inland waterway to the mouth of Schooner Bayou, then crosses the open waters of Vermilion Bay and enters the mouth of Bayou Vermilion. At present and for some years past no freight of any consequence has taken its course to the eastward that originated on the Vermilion. Some 10 years gone by river steamers made trips from New Orleans to Abbeville via Morgan City and across the Atchafalaya, Cote Blanche, and Vermilion Bays, but the route was deemed too hazardous and the traffic was discontinued. The danger of the open waters and the shallowness of the water in West Vermilion Bay rendered these undertakings unprofitable. The fish and oyster industry from Vermilion Bay and the Gulf to Abbeville is about the only commerce that would seek the present mouth of the Vermilion if the cut was made connecting the Vermilion with Schooner Bayou. All other traffic that naturally belongs eastward would remain dormant until the opening of the intercoastal between the Vermilion and the Teche. The cut-off is very much needed to accommodate the traffic now building up to the westward from Pecan Island, Lake Arthur, Leesburg, Lake Charles, and other points. The uncertainty of crossing from the mouth of the Vermilion to the mouth of Schooner Bayou keeps many boats from coming to or leaving Abbeville during the winter season, the heaviest shipping season of the year. There is only 3 to 3½ feet of water in Vermilion Bay, and frequently less. Local commerce is greatly reduced and hampered, and merchants hesitate to ship fragile or perishable freight. It is understood that boats have been grounded for several days and nights, causing great hardship for the boat crew and passengers. Even with all these difficulties, a small cargo of furs from Pecan Island, valued at $1,800, was recently received at Abbeville. From this island, just below White Lake, there was shipped this year about $30,000 worth of furs.

9. As already indicated, the type of improvement desired is an inland canal to connect the mouth of Bayou Vermilion with the mouth of Schooner Bayou (inland waterway), so that the small craft used in this section will not be subjected to the open waters of the bay. It is claimed that if this is done a much cheaper and safer route could be obtained and commerce would increase accordingly.

10. The history of the inland-waterway improvement is as follows:

The act of March 2, 1907, appropriated $89,292 for the inland waterway from Franklin to Mermentau, and the Secretary of War was authorized to enter into contract for additional amount not to exceed $200,000. This canal was to begin at Franklin on the Teche, pass through Cote Blanche and Vermilion Bays, and thence to the Mermentau River.

By act of March 3, 1909, the location of the eastern terminus may be changed as the Secretary of War may select, provided the modification shall not be made unless a valid title to the necessary right of way be secured to the United States free of cost.

By act of February 27, 1911, the Secretary of War was authorized, on the recommendation of the Chief of Engineers, United States Army, to make such changes in the location of said channel as may be considered desirable, provided that no change shall be made unless the necessary right of way is secured to the United States free of cost. It is understood that this clause was intended to make possible the selection of the most advantageous and least costly route between Vermilion Bayou and Bayou Teche, but it is not understood that it was intended to authorize changes involving a considerable excess in cost.

A proposed route north of Vermilion Bay, to avoid the frequent dredging required and the open waters of the bay, has been considered, and, it is understood, favorably reported by a special board of engineers. This route was to enter the Vermilion River from the east near the point marked "C." The route of the special board also included the cut-off A–B, now under consideration. Inasmuch as funds have not been appropriated for the increased expense involved in changing the location, the Chief of Engineers has so far directed that no work be done until further acted upon by Congress.

11. The inland waterway already constructed from Vermilion Bay to Mermentau River under authority of Congress has a width of 40 feet and depth of 5 feet, and if the cut-off now contemplated is adopted it should conform to the same general dimensions. The length, A–B, would be about 3½ miles. In order to avoid a bad bend in the river, the line A–B′ would be more advantageous, but would increase the length and cost about 15 per cent. The country through which the canal will run is low, uninhabited, unimportant marsh, about 1 to 2 feet above mean low water, and the work would consist of dredging along the line indicated.

12. The proposed work being thus through unoccupied land, would serve at present merely as a connecting link, and therefore the question of terminal or transfer facilities and wharves is not specially applicable. The facilities at Abbeville and other terminals along the Vermilion consist of pile wharves, loading by hand or crane. At various places landings are made on the banks themselves.

13. There are no features of water power involved.

The question of drainage is not now important, though possibly in the future the marsh lying near the proposed canal will be reclaimed.

It does not seem necessary to hold a public hearing.

14. This cut-off, or canal, appears to be one of the most important portions of the entire intercoastal waterway. As a part of a wholly inland waterway connecting the Mississippi River with the Sabine River, avoiding entirely the shallow lakes and open bays, the construction of this section is warranted and recommended. Considered as a canal to connect the mouth of Bayou Vermilion with the mouth of Schooner Bayou, it also has the same advantage in avoiding the open waters and shallow bays, and is recommended. The necessary right of way, 300 feet in width, should be donated to the United States, and has been promised, and is now being secured by the local interests.

It is believed the locality is worthy of improvement, and a report and estimate of cost of dredging the canal A–B or A–B′ can be submitted from data on hand. No further funds are required.

EDWARD H. SCHULZ,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
Baltimore, Md., December 18, 1912.

To the CHIEF OF ENGINEERS.

Forwarded, concurring in the opinion of the district officer that the channel or cut-off from Schooner Bayou to Vermilion River is worthy of construction by the United States, and, owing to conditions prevailing at the locality and the benefits which will result, it is believed that the work should be done at as early a date as possible.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 6, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. For reasons stated herein, the board concurs with the district officer and the division engineer in recommending the authorization of an estimate in order to determine the extent and advisability of the improvement.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT ON PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF VERMILION RIVER, LA., AND CHANNEL TO CONNECT WITH INLAND WATERWAY.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New Orleans, La., January 18, 1913.

From: District engineer officer.

To: Chief of Engineers, United States Army (through division engineer, Gulf division).

Subject: Plan and estimate, channel connect Vermilion River with Schooner Bayou.

1. In compliance with department instructions of January 9, 1913, I have to submit the following plan and estimate of cost for a channel or canal to connect Vermilion River with the inland waterway between Franklin and Mermentau at Schooner Bayou.

2. This report is a continuation of preliminary report made by this office on December 10, 1912, in accordance with the provisions of the river and harbor act of July 25, 1912. No further information

has come to hand as to the commercial or other interests involved, except that the canal is urgently needed to aid existing commerce from Schooner Bayou to Vermilion River. There are several vessels passing daily between the two bodies of water, and they must go by way of Vermilion Bay, involving considerable difficulty and delay.

3. The estimate is based on a survey of the locality already at hand, reference being invited to the two maps accompanying the preliminary report. On sheet 2 of these maps two routes were shown, marked "A–B" and "A–B′," the latter being somewhat longer. The advantage of route A–B′, the more northerly one, is that it will eliminate a bad bend in the Vermilion River. It is further understood that the right of way for this route, A–B′, has been investigated and is now being secured, and will be obtained without difficulty. For these reasons it is believed preferable to take the route A–B′, or, at least, leave the matter so that either route may be adopted, as may finally be most advantageous.

4. The improvement proposed is the dredging of a canal from point A on Schooner Bayou to point B′ on Vermilion River. The approximate length of the canal will be 4 miles. The bottom width will be 40 feet, with side slopes of 1 on 2, and a depth of 5 feet below mean low Gulf level, with an allowable overcut in depth of 1 foot. The right of way, to be donated to the United States free of cost, is to be 300 feet wide. The type of canal and width of right of way now proposed agree with the dimensions already adopted for the inland waterway from the Teche to the Mermentau.

5. The estimate for the line A–B′ is as follows:

250,000 cubic yards, at 15 cents	$37,500

For the line A–B the estimate is—

220,000 cubic yards, at 15 cents	$33,000

The work should be done as one job and in one season, and the initial appropriation should cover the entire estimate for the work. The estimated cost of maintenance is about 5 per cent, or $1,800 per year.

6. The locality is considered worthy of improvement, and it is recommended that the work be done in accordance with the plan and estimate of $37,500, indicated above, with the provisions that the right of way, 300 feet wide, be donated to the United States free of cost.

EDWARD H. SCHULZ,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
Baltimore, Md., January 22, 1913.

To the CHIEF OF ENGINEERS.

1. Forwarded, concurring in the opinion of the district engineer that the locality is worthy of improvement by the United States.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors on plan and estimate of cost of improvement, see p. 3.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1341.

RARITAN RIVER, N. J.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF RARITAN RIVER, N. J., INCLUDING A WIDENING OF THE CHANNEL FROM THE MILL OR MARTINS CREEK TO MARTINS DOCK ON THE NORTH SIDE.

February 4, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, February 4, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit, herewith, a letter from the Chief of Engineers, United States Army, dated 1st instant, together with copies of reports from Col. William T. Rossell, Corps of Engineers, dated December 16, 1911, and November 30, 1912, with maps, on preliminary examination and survey, respectively, of Raritan River, N. J., including a widening of the channel from the mill or Martins Creek to Martins Dock on the north side, made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 1, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Raritan River, N. J.

1. There are submitted herewith, for transmission to Congress, reports dated December 16, 1911, and November 30, 1912, with maps, by Col. William T. Rossell, Corps of Engineers, on preliminary examination and survey, respectively, of Raritan River, N. J., including a widening of the channel from the mill or Martins Creek to Martins Dock on the north side, called for by the river and harbor act approved June 25, 1910.

2. Raritan River is a stream of moderate size flowing in a general eastwardly and southerly direction in a winding course through the northern and central parts of New Jersey, and empties into Raritan Bay, which is an arm of the Atlantic Ocean. The controlling depth in the channel through Raritan Bay is 20 feet, which is in excess of depth recommended for Raritan River.

3. The existing project for improvement of Raritan River was adopted in 1878, and, with subsequent modifications, provides for a channel 200 feet wide and 10 feet deep from the mouth to the Delaware & Raritan Canal terminus at New Brunswick, including a south channel between Crab Island and Kearney's dock having a length of about 2½ miles, width of 100 feet, and depth of 5½ feet at mean low water, to be obtained by dredging, diking, and rock excavation.

For construction and maintenance there has been expended $740,912.04 up to June 30, 1912, when the project was reported to be two-thirds completed.

4. The stretch of river specially mentioned in the act is about one mile in length. The district officer states that the improvement desired is the deepening of the river on the north side of the channel just above Martins Creek to afford access to a terra-cotta brick plant. The commerce of the locality is practically limited to this one company, and the district officer states that the expense of the work would be very large in proportion to the commerce to be benefited, and he is therefore of the opinion that no improvement of this section is advisable.

5. In reference to the river as a whole, the district officer is of opinion that further improvement by the United States is warranted by the commercial benefits to be expected, and he submits with favorable recommendation a project providing for a channel 200 feet wide and 18 feet deep from deep water at Keasby to Washington Canal; thence 150 feet wide and 12 feet deep to the canal locks, including also the improvement of the south channel to a width of 150 feet and depth of 11 feet, at a total estimated cost of $1,100,959.31. This plan allows for an overdepth in dredging of 3 feet in the lower river and 2 feet for the other work mentioned, being with a view of securing navigable depths of 15, 10, and 9 feet at low water.

6. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 14, 1913. The board states that the commerce of this river, which exceeds 1,000,000 tons, valued at more than $64,000,000, is sufficient to warrant some improvement

beyond that contemplated in the existing project. It believes that it is advisable to enlarge the project to provide for navigable depths of 15 and 10 feet at low water, as contemplated by the district officer, but with allowance for only 1 foot overdepth in dredging, the estimated cost of which is $784,000 and $20,000 annually for maintenance.

7. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Raritan River, N. J., is deemed advisable so far as to secure a channel 200 feet wide and 15 feet deep from deep water at Keasby to Washington Canal; thence 150 feet wide and 10 feet deep to canal locks; and a width of 150 feet and depth of 10 feet in south channel, increased at entrances and on curves, following in general the methods described in the report of the district officer, at an estimated cost of $784,000 for first construction and $20,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $250,000 and subsequent appropriations of about $100,000 per year until the completion of the project.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
January 14, 1913.

To the Chief of Engineers, United States Army:

1. A survey of Raritan River having been made, the district officer submits estimates for channels 18 feet and 12 feet in depth, with a view to securing navigable depths at low water of 15 and 10 feet, in the sum of $1,121,626.22, and for similar channels, allowing but 1 foot overdepth throughout, in the sum of $783,437.82.

2. The district officer, who is also division engineer, believes that an overdepth of 3 feet should be allowed in the lower river and 2 feet for the other work contemplated, and he believes a 9-foot depth would serve in south channel. He expresses the opinion that Raritan River is worthy of improvement by the General Government in accordance with the following detailed estimate:

Locality.	Width.	Depth.	Estimate.
	Feet.	*Feet.*	
Deep water at Keasby to Washington Canal	200	18	$354,621.90
Washington Canal to Martin's Quarry Dock	150	12	27,692.10
Martin's Quarry Dock to canal locks	150	12	299,098.90
South channel	150	11	319,459.20
Total			1,000,872.10
Engineering and contingencies			100,087.21
Total			1,100,959.31

Or approximately $1,100,000. He states that the present estimate of $10,000 for maintenance should be increased to $20,000 for the new project.

3. The commerce reported for this river is in excess of 1,000,000 tons, having a value of more than $64,000,000. In the opinion of the board this is sufficient to warrant some improvement beyond that contemplated in the existing project, but the board believes that the channels for which the smaller estimate is made will provide for all essential needs of navigation for some time to come. It therefore recommends that the following project be adopted:

	Feet.	Amount.
From deep water at Keasby to Washington Canal	200 by 15	$236,000
Washington Canal to Martin's Quarry Dock	150 by 10	13,000
Martin's Quarry Dock to canal locks	150 by 10	144,000
South channel	150 by 10	320,000
Contingencies, etc		71,000
Total		784,000

Annual maintenance is estimated at $20,000. The board agrees with the district officer that the initial appropriation should be $250,000 and subsequent appropriations about $100,000, until the completion of the project.

4. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF RARITAN RIVER, N. J.

UNITED STATES ENGINEER OFFICE,
New York City, December 16, 1911.

SIR: 1. I have the honor to submit the following report upon a preliminary examination of "Raritan River, N. J., including a widening of the channel from the mill or Martins Creek to Martins Dock on the north side," made in compliance with department letter dated August 4, 1910, and pursuant to a requirement of the river and harbor act approved June 25, 1910.

2. The Raritan River is a stream of moderate size, which flows in a general eastwardly and southerly direction in a winding course through the northern and central parts of the State of New Jersey, and empties into the head of Raritan Bay between the cities of Perth Amboy and South Amboy. The navigable and tidal part of the river extends about 17 miles, from its mouth to a dam, above the city of New Brunswick, which feeds the Delaware & Raritan Canal. Practical commercial navigation ends in New Brunswick, about 12 miles above the mouth of the river, at the eastern terminus of the Delaware & Raritan Canal, although small boats can get up to near the dam at high water. The western end of this canal is at

Bordentown, on the Delaware River, and it forms the only connecting link of inland water navigation between the cities of New York and Philadelphia and other intermediate and more distant points.

3. The mean range of tides is about 5 feet at the mouth of the river, and about 5½ feet at New Brunswick.

4. The navigable part of the river is crossed by two drawbridges, which are located near its mouth. They are modern bridges, built by the New York & Long Branch Railroad Co. and Middlesex County, between Perth Amboy and South Amboy. The railroad bridge has two draw openings of 132 feet each and height or clearance of 8.6 feet above high water, and the highway bridge has two draw openings of 110 feet each and height of 8 feet above high water.

5. South River, a large tributary of the Raritan River from the south, joins the Raritan at Sayreville, which is 7 miles from the mouth of the Raritan River, through the Washington or South River Canal, which is a tide-level cut through the marsh made to intercept the South River at a point about 2½ miles by course of river above its mouth, to effect a saving of about 3 miles in the river route between the Raritan River and the town of South River, and the river itself joins the Raritan at a point about 1¼ miles above the canal. The commerce of the South River is carried on principally through this canal.

6. The improvement of the Raritan River is now in progress, under a project which was adopted June 18, 1878. This project provides for a channel to be formed by dredging, rock removal, and diking, 200 feet wide and 10 feet deep at mean low water, from the mouth to the canal entrance at New Brunswick. Report upon the survey upon which this project is based is printed in the Annual Report of the Chief of Engineers, for 1874, part 2, page 173. The original cost of this improvement was estimated at $2,093,662.05. This estimate was reduced in 1900 to $1,035,000. Up to the present time the project of 1878 stands as the existing project for the improvement of the Raritan River.

7. Before improvement there was a maximum low-water depth of 8.5 feet at "the Stakes," 3 miles from the river's mouth; 6.5 feet at the "Middle Grounds," 4 to 5 miles; 7.5 feet at Whiteheads Dock, 8½ miles; and 6.9 feet at New Brunswick, 12 miles. Below the Stakes the river had natural depths of from 15 to 30 feet; from the Middle Grounds to Whiteheads Dock, 12 to 20 feet; and natural depth of from 12 to 16 feet in the vicinity of Martins Creek.

8. The following progress upon this improvement has been made: Below Crab Island, 5½ miles above mouth of river: Dikes 1, 2, 3, 4, and C have been built and the main channel dredged where required to the full dimensions of the project. A channel was also dredged 5½ feet deep and 100 feet wide for a distance of 4,000 feet along the south shore, pursuant to acts of Congress, 1881–82. This channel was not completed and although partly redredged in 1906 it has not been maintained, and has reverted to its original condition of 3 to 5 feet depth.

Above Crab Island: A channel of the full dimensions has been excavated through the reef at Whiteheads Dock, 8½ miles above mouth of river. Above Whiteheads the width was limited to 100 feet, and this width, with a depth of 10 feet, has been carried to the canal outlet at New Brunswick. No advance has been made in the improvement since 1900, when it was reported that the channel was ample for the needs of navigation. Subsequent appropriations have been expended in maintaining channel depths as above stated.

$740,835.67 has been expended in this work, of which amount $81,643.35 has been expended for maintenance. Available funds provided by the river and harbor act of February 27, 1911, and balance from the previous appropriation, will be expended in restoring the 10-foot channel to New Brunswick.

9. The reach of the river specially mentioned in the act of June 25, 1910, "from the mill or Martins Creek to Martins Dock on the north side" is about 1 mile in length, and Martins Dock at the upper end of it is located about 2 miles below New Brunswick. Throughout this reach the river is from 400 to 500 feet in width, and for about half its length on the lower part it has a natural central channel with depths of from 12 to 16 feet for a width of 200 feet or more, and requires no deepening under the existing project, and no widening is permissible thereunder. Between this central channel and the shores the depth diminishes to from 1 or 2 feet at the shores. In the upper half of this reach a channel 10 feet in depth and about 100 feet in width has been excavated along the central part of the river, leaving shoal water on either side of it.

10. The improvement now desired at this point is the deepening of the river on the north side of the central channel just above Martins Creek, so that vessels which navigate the channel may reach the shore where the Brinkman Terra Cotta Brick Co.'s works are situated.

It appears from inspection of maps on hand that an additional width of about 100 feet would be required to carry the central channel depth to the north shore within the limits named in the act. Harbor lines which follow the shore lines closely, from the mouth to New Brunswick, were approved by the Secretary of War, November 3, 1890 (copies of lithograph maps herewith), and the opinion is advanced by interested parties that the General Government should deepen the river, if necessary for navigation purposes within these lines.

11. The following is an extract from letter of Hon. Benj. F. Howell, M. C., to the Chief of Engineers, United States Army, dated March 23, 1908:

> These people are large shippers of clay, and in view of the fact that their dock can not be extended to the channel because it is not permissible under the rules of the War Department, it would seem as though some relief might consistently be afforded them. If it is possible to have the river dredged at the point mentioned so that vessels may reach the dock easily it will be highly appreciated.

12. There are no terminal facilities open to the public or rail connections available in the locality. The wharf of the Brinkman Terra Cotta Co., Widmars Dock, and Martins Dock on the north side of the river, and Whiteheads Sand Dock on the south side of the river have no terminal facilities which would be utilized by the public, these wharves being practically isolated and devoted to their respective private businesses.

The improvement of the Raritan River as proposed would have no bearing on the subject of water power, floods, or land reclamation.

13. The commerce of this locality is limited to that of the Brinkman Terra Cotta Co. and that of the Whitehead Bros. Co., the latter being on the south side of the river would not be benefited by a widening on the north side. The statistics obtained are as follows:

COMMERCIAL STATISTICS FOR THE YEAR ENDING DEC. 31, 1909.

Raritan River (mouth of Martins Creek).

[Statement by Brinkman Terra Cotta Co.]

Articles.	Received.		Shipped.	
	Tons.	Estimated value.	Tons.	Estimated value.
Brick (hollow)			5,600	$34,100
Coal	2,072	$5,800		
Fire clay	840	1,260		
Clay and sand	2,364	2,364		
Total	5,276	9,424	5,600	34,100

VESSELS ARRIVING AND DEPARTING.

Class.	Number of trips.	Draft when loaded.	Tonnage.
		Feet.	
Tugs	71	5- 6	
Sail vessels	20	6-10	150-250
Barges, etc	51	5-10	200-300
Total	142	5-10	150-300

Lawrence Creek.

[Statement by Whitehead Bros. Co.]

Articles.	Shipped.	
	Tons.	Estimated value.
Clay	1,000	$1,000
Sand	39,198	39,198
Total	40,198	40,198

VESSELS ARRIVING AND DEPARTING.

Class.	Number of trips.	Draft when loaded.	Tonnage.
		Feet.	
Sail vessels	32	6 to 12	200 to 500
Barges, etc	127	5 to 10	150 to 600
Total	159	5 to 12	150 to 600

14. It appears from information received in connection with this examination that the other improvements of Raritan River now desired are:

First. A 15-foot channel to the mouth of the Washington Canal and Sayreville.

Second. To open up a south channel to connect with the main channel at Crab Island and the main channel below the Middle Grounds, which extends about 2 miles below Crab Island.

Third. To provide a 9-foot channel to New Brunswick. It will be noted that this is less than the depth now provided by the existing project.

There is probably no demand for a greater depth in the upper part of the river than that provided for under the existing project. The commerce of the Pennsylvania Railroad Co., owner of the Delaware & Raritan Canal, and the city of New Brunswick are limited to the depth of water in the canal, or about 7½ feet over the miter sills of the locks. The lower lock is a tidal lock, the gates of which are kept open from rising half-tide to falling half-tide, when they are closed to maintain a depth of 6 feet along the city water front. Outside of this embanked pool there is only a few feet of water in the river at low tide. Below the lower lock the water front is owned by the Pennsylvania Railroad Co., and it was formerly used for the purpose of assembling tows of barges passing in and out of the canal. The channel dredged by the United States, 10 feet in depth, extends to this dock.

COMMERCIAL STATISTICS, CALENDAR YEAR 1910.

Raritan River.

VESSEL CLASSIFICATION.

Class.	American (number of trips.)	Net registered tonnage.	Draft when loaded.
Registered:			*Feet.*
Stem	1,609	45–250	8 –11
Sailing	500	20–300	6½–11
Barges	855	103–518	7 –11
Unregistered:			
Sailing	421		
Barges	1,814		
Total	5,199	20–518	6½–11
Vessels engaged in commerce on South River that pass over Raritan River	462		
Total	5,661	20–518	6½–11

FREIGHT TRAFFIC.

Articles.	Customary units.		Amount in short tons.	Valuation.
	Unit.	Quantity.		
Brick	M	115,000	257,600	$690,000
Coal	Long tons	73,813	82,672	281,783
Ores and metals	Pounds	325,533,427	162,767	41,000,770
Stone, clay, and sand	Long tons	225,355	252,398	365,333
Fireproofing and clay products	do	97,930	109,682	559,865
Cotton	Short tons	2,000	2,000	520,000
Miscellaneous	Long tons	1,809	2,026	3,221
Medical supplies	Short tons	3,645	3,645	2,916,224
Rubber goods	do	2,348	2,348	9,152,836
Produce	Long tons	3,974	4,451	119,220
Oils	Short tons	2,675	2,675	320,000
General merchandise	do	77,410	77,410	5,908,995
Lumber	Long tons	10,617	11,891	148,538
Meats	do	1,406	1,575	280,000
Cigars and tobacco	Short tons	730	730	2,191,140
Total			983,860	64,457,925
Commerce of South River that passes over Raritan River.	Brick Long tons	20,200,000 78,707	128,550	431,061
Total			1,112,410	64,888,986

Statement of freight traffic on Raritan River for year 1910.

[Furnished by Hon. Thomas J. Scully, M. C.]

Name of shipper.	Commodity.	Outgoing freight.	Value.	Incoming freight.	Value.
		Tons.		*Tons.*	
Pennsylvania Railroad Co.	Miscellaneous manufactured articles.	98,485	$1,819,471.00		
Do	Coal	59,857	269,356.50		
Sayre & Fisher Co	Brick	221,013	926,188.33		
Do	Coal and miscellaneous			13,739	$72,806.69
Great Eastern Co		40,395	325,000.00		
National Fire Proofing Co.	Fireproofing material, etc.	90,000	425,000.00		
Whitehead Bros. Co	Sand and clay	60,312	60,312.00		
Petitt & Co	Brick	32,000	90,000.00		
Do	Coal			3,000	15,000.00
South River Brick Co	Brick	20,000	65,000.00		
Do	Clay	100,000	20,000.00		
Do	Lumber			387	3,870.00
Do	Coal			1,000	4,750.00
Edward Furman	Brick	40,000	120,000.00		
Middlesex Transportation Co.	Cotton compressed	2,000	520,000.00		
Do	Rubber goods	1,748⅘	6,995,320.00		
Do	Crude rubber	599	2,157,516.00		
Do	Cigars and tobacco	730⅜	2,191,140.00		
Do	Surgical dressings	3,645¼	2,916,224.00		
Do	Miscellaneous	15,210 9/10	4,562,282.00		
Raritan Copper Works	Copper (about)	122,062	36,296,000.00		
Miscellaneous shippers	Vaseline (about)	1,250	250,000.00		
Do	Produce (about)	2,349	128,000.00		
Total		911,657⅜	60,136,829.83	18,126	96,426.69

For that section of the Raritan River above its junction with South River, including the port of New Brunswick, N. J.:

VESSEL CLASSIFICATION.

Class.	American (number of trips).	Net registered tonnage.	Draft when loaded.
Registered:			*Feet.*
Steam	977		5–11
Sailing	69	100–250	6–11
Barges	166	150–300	5–11
Unregistered, barges	1,041		
Total	2,253	100–300	5–11

FREIGHT TRAFFIC.

Articles.	Customary units.		Amount in short tons.	Valuation.
	Units.	Amount.		
Coal	Long tons	61,707	69,112	$245,228
Stone, clay, and sand	do	81,795	91,610	196,076
Fireproofing and clay products	do	5,000	5,600	34,100
Cotton	Short tons	2,000	2,000	520,000
Medical supplies	do	3,645	3,645	2,916,224
Rubber goods	do	2,348	2,348	9,152,836
Produce	Long tons	3,974	4,451	119,220
General merchandise	Short tons	77,410	77,410	5,908,995
Lumber	Long tons	10,617	11,891	148,538
Meats	do	1,406	1,575	280,000
Cigars and tobacco	Short tons	730	730	2,191,140
Total			120,372	21,712,357

Statement showing commercial traffic on the Delaware & Raritan Canal.

[These figures were partly furnished by H. W. Dunn, assistant superintendent, Delaware & Raritan Canal.]

VESSEL CLASSIFICATION.

Class.	American registered (number of boats).
Steam and gasoline	680
Sailing	13
Barges	934
Total	1,627

FREIGHT TRAFFIC.

Articles.	Customary units.		Amount in short tons.	Valuation (estimated).
	Amount.	Unit.		
Coal	29,779	Long tons	33,353	$133,412
Brick	559,000	Brick	1,119	3,100
Logwood	4,280	Short tons	4,280	59,520
Niter cake	3,083	do	3,083	25,000
Grain	148,400	Bushels	4,451	111,274
Salt and saltcake	3,110	Short tons	3,110	31,100
Fertilizer	680	do	680	13,600
Oils	2,492	do	2,492	50,000
Lumber	7,553	do	7,553	105,742
Ores and metals	2,307	do	2,307	57,675
Cast-iron pipe	29,481	do	29,481	30.000
Machinery and manufactures	691	do	691	120,000
Wire rods	3,440	do	3,440	230,000
Stone and sand	24,591	Long tons	27,543	41,314
Cinders	4,186	do	4,689	2,000
Clay	2,735	do	3,064	4,596
Feldspar	7,700	Short tons	7,700	38,500
General merchandise	5,744	do	5,744	436,500
Miscellaneous	2,472	do	2,472	10,000
Total			147,252	1,503,333

The variation in tonnage, valuation of commerce, and appropriations for Raritan River are shown on the following diagram.

15. Information received from business men and industries along the Raritan River:

[National Fire Proofing Co., Perth Amboy, N. J.]

BELOW THE STAKES.

The depth of water is sufficient as far as we are concerned; 15 feet is sufficient for our trade.

Eighteen to 20 feet would probably be sufficient for the prospective needs of commerce. This would enable tramp steamers to be loaded and discharged.

Increase of channel dimensions would increase the commerce for the reason that it would facilitate an additional tonnage now barred out.

It is difficult to say whether an increase of channel depths would have any effect to reduce freight rates. It probably would have a tendency to do so.

We have no plans for increase of receipts or shipments by water.

[Ostrander Fire Brick Co., Perth Amboy, N. J.]

BELOW THE STAKES.

Not sufficiently informed on subject to venture opinion.

[Didier-March Fire Proofing Co., Perth Amboy, N. J.]

BELOW THE STAKES.

The depth of water is not sufficient for the present demands of commerce. Twelve to 15 feet is required.

For our purpose 12 feet would be sufficient for prospective demands.

An increase of channel dimensions would aid materially in developing the territory adjoining the Raritan River.

An increase of depth would have a tendency to reduce freight rates by permitting vessels of greater capacity to call for freight.

We have no plans for increase of receipts or shipments other than the natural development of our business.

[Crossman Clay Co., Sayreville, N. J.]

SOUTH CHANNEL.

Depth of water is not sufficient for present demands of commerce. Six feet is required.

Six to eight feet would be sufficient for prospective demands of commerce. This would enable us to load harbor boats and coasting vessels to full draft.

Increase of channel dimensions would double our business.

Increase of channel depths would reduce freight rates 5 cents a ton.

We desire to be able to load vessels for eastern ports, which we can not do now. Our material is wanted but we have to decline sales.

[Whitehead Bros. Co., sand and clay, Sayreville, N. J.]

DOCK AT SOUTH CHANNEL, TOWN OF SAYREVILLE, ABOVE MOUTH OF OLD SOUTH RIVER, AT MOUTH OF LAWRENCE CREEK.

Depth of water is not sufficient for present demands of commerce. Fifteen feet is required.

A 15-foot depth would be sufficient for prospective demands of commerce. This would enable us to load large boats for eastern trade.

An increase of channel dimensions would cause a large increase in commerce.

An increase of channel depths would have an effect to reduce freight rates.

We have plans for increase of shipments by water.

[Sayre & Fisher Co., Sayreville, N. J.]

The depth of water is not sufficient for the present demands of commerce. Fifteen feet is required at the Middle Ground.

Fifteen feet would be sufficient for prospective demands of commerce. This would enable us to load vessels and ship direct from Sayreville and vicinity to eastern and southern ports without relightering.

Increase of channel dimensions would increase commerce materially.

Increase of channel depths would reduce freight rates by enabling shippers to load larger and deeper draft vessels at lower rates.

We have plans for increase in shipments providing we have greater depth over the Middle Ground.

[Middlesex Transportation Co., New Brunswick, N. J.]

The depth of water is not sufficient for the present demands of commerce. Nine feet at least is required.

Twelve feet would be sufficient for the prospective demands of commerce. This would enable larger craft to navigate.

Increase of channel dimensions would increase commerce fourfold at once.

Increase of channel depth would probably reduce freight rates.

We have plans for increase of trade by water.

The above refers to the river between Sayreville and New Brunswick.

Seventeen other business men and industries along the river have been written to, but as yet have not replied.

TERMINAL FACILITIES, ETC.

16. (*a*) There are three docks in New Brunswick, N. J., owned by the city to which terminal facilities are extended to all on equal terms. They are located along the Delaware and Raritan Canal at the following points: At the foot of Washington, Center, and Bishop Streets. With the exception of the dock at the foot of Bishop Street, these docks are in poor condition and practically useless in their present state.

(*b*) The city wharves at New Brunswick, N. J., have no direct connection with rail or water lines.

(*c*) Terminal facilities held by individuals or corporations, which are extended to all on equal terms:

At New Brunswick, N. J., there is a wharf leased by Conrad Sebolt, adjoining the Pennsylvania Railroad bridge on the east side, available to all on equal terms.

Martins Dock, located 2 miles below New Brunswick, may be available, but it is in bad condition and practically unavailable in its present state.

(*d*) Space is available in the vicinity of Perth Amboy that is convenient to the public and may be used for the construction of public docks.

(*e*) There are no mechanical appliances for handling freight at the city docks in New Brunswick. Sebolts Wharf in New Brunswick has a simple steam derrick. A few of the private docks are equipped with mechanical devices of a simple nature, principally derricks, for loading and unloading purposes.

(*f*) The following parties and industries have wharves and terminal facilities along the river which are not open to the public use:

- At Perth Amboy, N. J.:
  - Raritan Copper Works.
  - American Fire Proofing Co.
  - Ostrander Fire Brick Co.
  - Perth Amboy Fire Brick Co.
  - Chesebrough Manufacturing Co., vaseline.
  - Didier-March Co., fire-proofing and clay products.
- At Sayreville, N. J., and vicinity:
  - Crossman Co., clay and sand.
  - Edgar Clay Co.
  - C. A. Bloomfield, clay and sand.
  - Sayre & Fisher Co., brick works.
  - Whitehead Bros. Co., clay and sand.
- By Martins Creek:
  - Brinkman Terra Cotta Co.
  - Whitehead Bros. Co., sand and clay.
  - Widmars Dock.
  - Martins Dock.
- At New Brunswick, N. J.: The old steamboat dock owned by the Pennsylvania Railroad Co.

At New Brunswick, N. J., the following industries and parties have docking facilities along the Delaware & Raritan Canal:

- United States Rubber Co.
- Janeway & Co., wall paper.
- Norfolk & New Brunswick Hosiery Co.
- Conrad Sebolt, contractor.
- Middlesex Transportation Co.
- Johnson & Johnson, Red Cross medical supplies.

The following parties in New Brunswick, N. J., have water connections along the Delaware & Raritan Canal, but outside of receiving some coal do practically no water business:

Cronk Manufacturing Co., window sashes.
Rolfe Building Material Co.
John Collier, coal.
P. P. Runyon, wholesale supplies.
P. M. Welsh, coal and masons' material.
E. Tindell, coal.
Howell Lumber Co.
Raritan Coal Co.
W. Schlessinger, coal and wood.
Henderson Iron Co.
Consolidated Fruit Jar Co.

17. In my opinion the proposed widening of the Raritan River, from Martins Creek to Martins Dock, is not worthy to be undertaken by the General Government. The expense of the work would be very large in proportion to the commerce to be benefited. In this connection attention is invited to an extract from the report of Col. D. W. Lockwood to the Chief of Engineers, dated April 3, 1908, in reference to this and similar propositions:

> At the Brinkman Terra Cotta Co. the wharf is on the north side of the river, which is about 400 feet wide at that locality. The natural channel passes through the center of the river and has a depth of from 12 to 16 feet at mean low water, and a width of about 200 feet, and there is an area of over 100 feet in width between this channel and the wharf. The depth on this area diminishes gradually from 10 feet on the north side of the channel to from 0 to 1 foot at mean low water at the wharf. This condition at this locality has existed for 50 years, as shown by the maps on file in this office.
>
> * * * the river has naturally the full projected width and depth, and as the United States has cleared up the stream at other places so as to afford a continuous channel 200 feet wide and 10 feet deep it is recommended that wharf owners be required to connect with the channel at their own expense, for otherwise a troublesome precedent would be established, and the cost of maintenance of this and other streams like it greatly increased.

In my opinion the Raritan River is worthy of improvement by the General Government to the extent of providing a channel 15 feet deep at mean low water and 200 feet wide to Sayreville, N. J., and the mouth of the Washington Canal, thence to New Brunswick, N. J., 10 feet deep at mean low water and 150 feet wide, and a south channel at the "Middle Ground" 10 feet in depth at mean low water and 150 feet wide.

It is estimated that a survey with plans and estimates will cost about $2,500, and an allotment of that amount is recommended for same from the appropriation for examinations, surveys, and contingencies of rivers and harbors, section 3, act of June 25, 1910.

18. Letters[1] received in connection with this report, including those furnished by Hon. Thomas J. Scully, M. C., are forwarded herewith.

Very respectfully, your obedient servant,

Wm. T. Rossell,
Colonel, Corps of Engineers.

The Chief of Engineers, United States Army.

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[1] Not printed.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 8, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The existing project for the improvement of Raritan River provides for a channel 200 feet wide and 10 feet deep from the mouth to the Delaware & Raritan Canal terminus at New Brunswick, and for a south channel between Crab Island and Kearney's dock, with a length of about 2½ miles, width of 100 feet, and a depth of 5½ feet at mean low water. The cost of this work was originally estimated at $2,093,662, but was subsequently reduced to $1,035,000. The amount expended up to June 30, 1911, was $740,818.10, of which $659,192.32 was used for carrying on the work and $81,526.78 for maintenance. On that date the maximum draft that could be carried in the river was 10 feet to within 1 mile of the head of navigation and 9 feet for the remainder of the distance.

3. The within report was submitted in compliance with an item in the act of June 25, 1910, ordering a preliminary examination of "Raritan River, including a widening of the channel from the mill or Martins Creek to Martins Dock, on the north side." The reach of the river specially mentioned in the act is about 1 mile in length, its upper end being about 2 miles below New Brunswick. The lower part of the reach has natural widths and depths in excess of those provided for by the existing project, and in the upper part a channel 10 feet deep and 100 feet wide has been excavated along the central part of the river, leaving shoal water on either side of it. The district officer states that the improvement now desired at this point is the deepening of the river on the north side of the channel just above Martins Creek, so that vessels which navigate the channel may reach the shore where the Brinkman Terra Cotta Brick Co.'s works are situated. It appears that the commerce of the north shore at this locality is limited to that of the company mentioned, which is reported as amounting to 10,876 tons, valued at $43,524, in 1909. The district officer states that the expense of the work would be very large in proportion to the commerce to be benefited, and he is of opinion that the proposed improvement is not worthy to be undertaken by the General Government. The board concurs in this opinion, believing that the work desired should be executed by the interests concerned and not by the United States.

4. With reference to the river as a whole, the improvements desired are reported to be a 15-foot channel to the mouth of the Washington Canal and Sayreville, the opening up of a south channel to connect with the main channel at Crab Island and the main channel below the Middle Grounds, and a 9-foot channel to New Brunswick, this depth, however, being less than that now provided by the existing project. The district officer is of opinion that Raritan River is worthy of improvement by the General Government to the extent of providing a channel 15 feet deep at mean low water and 200 feet wide to Sayreville and the mouth of the Washington Canal; thence to New Brunswick, 10 feet deep at mean low water and 150 feet wide, and a south channel at the Middle Ground of the same dimensions; and he recommends that a survey be authorized, at an estimated cost of $2,500.

The commerce of the river is large and important, and the board believes that a survey should be made to determine the cost and advisability of the work proposed by the district officer. An allotment for this purpose is therefore recommended. It is also recommended that he give consideration to and report upon the advisability of a channel of less capacity, and, if practicable, furnish an estimate of the amount of commerce that requires a greater draft than that provided in the existing project.

For the board:

W. C. Langfitt,
Lieut. Col., Corps of Engineers,
Senior Member Present.

[Third indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, January 15, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Raritan River, N. J., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. Bixby,
Chief of Engineers, U. S. Army.

[Fourth indorsement.]

War Department, *January 16, 1912.*

Approved as recommended by the Chief of Engineers.

Robert Shaw Oliver,
Assistant Secretary of War.

SURVEY OF RARITAN RIVER, N. J.

United States Engineer Office,
New York City, November 30, 1912.

From: Col. Wm. T. Rossell, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Survey report on Raritan River, N. J., act of June 25, 1910.

1. Report upon a survey of "Raritan River, including a widening of the channel from the mill or Martins Creek to Martins Dock on the north side," made in compliance with instructions contained in letter of the Chief of Engineers dated January 19, 1912, and pursuant to the requirements of section 3 of the river and harbor act approved June 25, 1910.

2. The survey consisted in relocation of the shore lines to bring same up to date, and in taking soundings over the whole stretch of river between the highway bridge near its mouth and the head of navigation near New Brunswick. The results of the survey are shown on three sheets submitted herewith. The borings taken in connection with the execution of work under the existing project were

sufficient to supply the necessary information for making estimates of rock removal. The rock lies principally in the upper 3 miles of the river, and it is proposed merely to widen the present dredged channel in that section of the river.

3. In view of the department instructions contained in paragraph 8, letter of August 3, 1912, in reference to the estimates for maximum draft of boat for which channel is designed, the following estimates have been made for channels which at mean low water will have minimum widths of 200 and 150 feet, and minimum depths of 15 and 10 feet in the main channel, and 10 feet in south channel, the lesser depths in the second estimate being estimated for in accordance with paragraph 4 of the report of the Board of Engineers for Rivers and Harbors, Washington, D. C., January 8, 1912. Further investigations, however, indicate that at least 10 feet for the upper part of the river as now projected and 15 feet for the lower part are needed, and it appears advisable to adopt the 12-foot estimate for the upper part of the river to provide a minimum low-water depth of 10 feet, and the 18-foot estimate to get a navigable depth of 15 feet in the lower part of the river, or below Washington Canal, and those estimates are recommended. The proposed improvement of the south channel might be reduced to 9 feet depth, and the 11-foot estimate is recommended for that part of the proposed project for the improvement of the river.

4. Additional commercial statistics for the year 1910–11 showing approximate amount of commerce now carried in vessels having a draft exceeding 10 feet:

Class of vessel.	Number of boats.	Number of trips.	Draft when loaded.	Net registered tonnage.
			Feet.	
Steamers	1	159	11	173
Sailing vessels	15	20	10–14	400–500
Barges	30	30	10–14	600–700
Total	46	209		

Freight traffic.

Articles.	Customary units.		Amount in short tons.	Valuation.
	Amount.	Unit.		
Fireproofing	27,507	Short tons	27,507	$130,658
Clay	8,000	do	8,000	16,000
Sand	16,800	do	16,800	16,800
Total	52,307	do	52,307	163,458

Practically all this commerce is carried on the river below Sayreville. This report is compiled from reports made by parties engaged in commerce along that part of the river, and it is stated by them that increased depth is required for vessels which will be employed in commerce on this river when the depth is sufficient. No reliable estimate of this trade is available at present. Attention is invited to reports of shippers in report on preliminary examination.

Estimates.

Locality.	Length.	Width.	Depth.	Operation.	Quantity.	Rate per cubic yard.	Cost.
	Feet.	*Feet.*	*Feet.*		*Cu. yds.*		
Deep water at Keasby to Washington Canal.	24,863	200	18	Dredging	1,182,073	$0.30	$354,621.90
Washington Canal to Martin's quarry dock.	19,273	150	12	do	92,307	.30	27,692.10
Martin's quarry dock to canal locks.	8,494	150	12	Dredging	102,631	.30	30,789.30
				Rock removal	103,196	2.60	268,309.60
South channel	15,685	150	12	Dredging	1,127,491	.30	338,247.30
Total							1,019,660.20
Engineering and contingencies, 10 per cent.							101,966.02
Total							1,121,626.22

Further estimates have been prepared for consideration which provide for depths of 15, 10, and 8 feet by allowing 1 foot only for overdepth, according to the old custom, as follows:

Estimates.

Locality.	Length.	Width.	Depth.	Operation.	Quantity.	Rate per cubic yard.	Cost.
	Feet.	*Feet.*	*Feet.*		*Cu. yds.*		
Deep water at Keasby to Washington Canal.	24,863	200	16	Dredging	786,393	$0.30	$235,917.90
Washington Canal to Martins Quarry Dock.	19,273	150	11	do	42,570	.30	12,771.00
Martins Quarry Dock to Canal Locks.	8,494	150	11	do	99,171	.30	29,751.30
				Rock removal	43,968	2.60	114,316.80
South Channel	15,685	150	11	Dredging	1,064,864	.30	319,459.20
Total							712,216.20
Engineering and contingencies, 10 per cent.							71,221.62
Total							783,437.82
South Channel	15,685	150	9	Dredging	939,609	.30	281,882.70

The above estimates are based on scow measurement, the proportion between scow and prism measurement being 100 to 80 for soft or ordinary material and 100 to 75 for rock. Overdepth dredging of 1 foot estimated to cover mechanical inaccuracies of dredging processes; side slopes of 1 on 1½ in rock and 1 on 2 in other materials.

5. In my opinion the Raritan River is worthy of improvement by the General Government to the extent of providing channels with depths of 15 and 10 feet in the main channel and 9 feet in the south channel, in accordance with the foregoing estimates.

6. Annual maintenance, now $10,000 in existing project, is estimated at $20,000 in the new project. This will cover the necessary repairs of dikes built under the existing project. The rock to be excavated in increasing the width and depth above South River will be placed in the dikes, and such use of the material will render the dikes more permanent and obviate the necessity for timber repairs, and it will probably not increase the cost of the rock removal.

7. The initial appropriation should be $250,000 and succeeding appropriations about $100,000 until completion of the project.

Wm. T. Rossell.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

○

TY, J.L.BAKER SURVEYOR.
DRAFTSMAN.

o. 1341 ; 62d Cong., 3d Sess.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1342.

FANCY BLUFF CREEK, GA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF FANCY BLUFF CREEK, CONNECTING TURTLE RIVER AND BRUNSWICK HARBOR WITH LITTLE SATILLA RIVER, GA.

February 4, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 4, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copies of reports from Col. Dan C. Kingman, Corps of Engineers, dated September 5, 1912, and January 6, 1913, with map, on preliminary examination and survey, respectively, of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 3, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Fancy Bluff Creek, Ga.

1. There are submitted herewith, for transmission to Congress, reports dated September 5, 1912, and January 6, 1913, with map, by Col. Dan C. Kingman, Corps of Engineers, on preliminary examina-

tion and survey, respectively, of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga., called for by the river and harbor act approved July 25, 1912.

2. Fancy Bluff Creek lies in the drainage basin of the South Brunswick and Turtle Rivers and enters Brunswick Harbor through them. Its upper end is but a short distance from the Little Satilla River, which empties into St. Andrews Sound. The controlling depths in the South Brunswick, Turtle, and Little Satilla rivers are in excess of the projected depth in the Fancy Bluff Creek.

3. From the report of the district officer, who is also division engineer, it appears that several years ago this waterway was opened up to commerce by local authorities by the dredging of a canal about 1,200 feet long, connecting the upper end of Fancy Bluff Creek with the Little Satilla River. The canal is small and is nearly dry at low water; nevertheless, it has maintained itself well and is quite extensively used. While Brunswick Harbor is available to deep-drafts vessels, the improvement of Fancy Bluff Creek is required for the use of light-draft boats plying to points on Little Satilla River. The district officer states that if the cut were widened and deepened so as to afford a dependable route at all stages of the tide, its use would be much more frequent and its value proportionately greater. He is of opinion that the improvement of the creek by dredging a cut 4 feet deep and with a bottom width of about 50 feet, at an estimated cost of not to exceed $8,000, is worthy of being undertaken by the General Government.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, attention being invited to the board's report herewith, dated January 20, 1913, concurring with the views of the district officer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga., is deemed advisable so far as to secure an available channel depth of 4 feet and a channel width of 50 feet increased at entrances and on curves at an estimated cost of $8,000 for first construction, this estimate being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
January 20, 1913.

To the Chief of Engineers, United States Army:

1. Fancy Bluff Creek is a small stream emptying into South Brunswick River about 5½ miles from Brunswick. The creek heads

within a short distance of Little Satilla River, with which it has been connected by a small cut, at an expense of $2,500, contributed by Glynn County. Through this channel considerable commerce and a large number of passengers are carried on small boats, which can now operate only on the tides. The improvement desired is the enlargement of the cut and such deepening of the upper part of the creek as may be necessary.

2. A survey having been made, the district officer, who is also division engineer, presents a plan of improvement for a channel 4 feet deep at ordinary low tide and 50 feet bottom width, estimated to cost $8,000. He states that the cost of maintenance would be very small, if anything at all, and that he is of opinion that the waterway is worthy of improvement.

3. It appears that local interests found this waterway of sufficient importance to justify an expenditure by them of $2,500, and, as it saves about 16 miles in distance and is more sheltered than the outside route, it is used even in its poor navigable condition by a large number of boats engaged in traffic between Brunswick and Little Satilla River.

4. In view of the probable small maintenance charge, the board believes the cost of improvement is not unreasonable when compared with anticipated benefits, and it therefore concurs in the views of the district officer and reports that in its opinion it is advisable for the General Government to undertake the improvement of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga., by the provision of a channel 4 feet deep and 50 feet bottom width, at an estimated cost of $8,000, all of which should be made available in one appropriation.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF FANCY BLUFF CREEK, GA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Savannah, Ga., September 5, 1912.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Fancy Bluff Creek, Ga.

1. The river and harbor act of July 25, 1912, calls for an examination of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with the Little Satilla River, Ga. In its natural condition Fancy Bluff Creek did not form a connection between these two points, but several years ago the commissioners of Glynn County, Ga., under authority of the War Department, expended about $2,500 in dredging a canal about 1,200 feet long, connecting the upper end

of Fancy Bluff Creek with the Little Satilla River. This made the through connection. The canal excavated by the county is a small affair and is nearly dry at low water. Nevertheless it has maintained itself well and is quite extensively used by small boats between Brunswick and points on the Little Satilla River. It shortens the distance about 16 miles and gives a safe and sheltered route throughout. It is estimated that as much as $100,000 worth of freight was carried through this route last year, the means of transportation being largely motor boats and small barges.

2. The shallowness of the present route is a source of serious inconvenience, and there is a very general desire that it be made wider and deeper. It is a small affair, and the amount of money that it would be justifiable to expend on it would necessarily be small; still, within limits, I think it would be a valuable improvement and would be worth a moderate expenditure.

3. How the improvement could best be made and how much it would cost can only be determined by a survey, and this survey should follow not only the present route but should also take cognizance of a possible cut across the low neck marked upon the map, where Fancy Bluff Creek apparently comes within less than 1,000 feet of the Little Satilla River. A good-sized cut made here would be much more likely to maintain itself than at the other place, and it would shorten the distance considerably and make the route available for a larger class of boats. I think that the improvement is worthy of a survey.

DAN C. KINGMAN.

[Second indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, September 23, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

This waterway, provided partly at local expense, appears to be quite extensively used by small boats, but the traffic is subject to serious inconvenience and delay, and the district officer is of opinion that the locality is worthy of a survey to ascertain the best plan of improvement and to determine its cost. The board believes that the advisability of the improvement is dependent on the cost, and it therefore concurs with the district officer in recommending that a survey be authorized.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT OF ASSISTANT ENGINEER E. R. CONANT.

UNITED STATES ENGINEER OFFICE,
Savannah, Ga., September 5, 1912.

SIR: 1. The river and harbor act approved by Congress July 25, 1912, provided for a preliminary examination to be made of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga.

2. The Little Satilla River enters Jekyl Sound 12 miles south of Brunswick. Fancy Bluff Creek enters Brunswick Harbor by way of South Brunswick and Turtle Rivers. The distance from the north mouth of Fancy Bluff Creek to Brunswick is 5½ miles. The length of the waterway is 4½ miles. Five

years ago Glynn County appropriated and expended $2,500 in connecting the headwaters of the creek with the Little Satilla River by way of a cut-off about 1,200 feet long, which was dredged to about mean low water. The opening of this canal or cut-off shortened the distance for users of the Satilla River for navigation 16 miles, this being the distance saved to reach Brunswick. Not only is this distance saved, but when the cut-off can be used for navigation exposure to the water of Jekyl and St. Simon Sound is avoided. There are a large number of plantations bordering the Little Satilla River and there exists a considerable amount of timber near its headwaters and a considerable amount of naval stores is collected from lands bordering this waterway. All the farm products, naval stores, and lumber are brought to the Port of Brunswick and in return considerable merchandise is taken from Brunswick to the plantations.

3. As the connection between the Little Satilla River and Fancy Bluff Creek can only be used on or near high water, a large percentage of the freight now handled on the Satilla River has to be brought around by Jekyl Sound. From information received from reliable parties it is estimated that at least $100,000 worth of freight was transported through Fancy Bluff Creek last year. It is learned from parties interested that the improvement desired is the deepening of the cut-off connecting Little Satilla River with Fancy Bluff Creek and deepening the headwaters of this creek so as to obtain 3 or 4 feet at mean low water. Extracts from letters received from some of the parties interested are as follows:

"I am doing a towing and lighterage business in this harbor (Brunswick Harbor) and my work frequently takes me through the waters of Fancy Bluff Creek. My business is very much bothered by waiting for tides, thereby necessitating delays which makes it take nearly double the time to make a tow. My towing at times is heavy, and if anything is done in the way of improvement it will help me a great deal in my business." (A. R. Berry.)

"I am in the towing business and my work carries me through Fancy Bluff Creek a good deal. I can not get my lighters over the shoals until high water, and this causes a delay so as to make it take nearly double the time to make a tow. If the shoals could be removed so as to give a 3-foot channel at low water, it would help every branch of business and be a big benefit to me." (G. N. Tharin.)

"If the shoals were deepened, a great many crossties would be shipped over this route. Our shipments through this creek last year amounted to about 500 barrels of naval stores. During the calendar year we will ship 1,000 barrels; shipments for 1913 will likely be 1,300 barrels, which will be our normal shipment of naval stores for many years. There is always a return of supplies in proportion to the outward shipments. The improvement to 3 feet at low water would stimulate business in many lines." (Davis & Brandon.)

"We are in the towing and lighterage business and have occasion to tow our lighters a great deal through Fancy Bluff Creek. We are anxious to have the shoals deepened in this creek." (Burns & Dickey.)

"There would be a great saving of time to us in transporting freight, towing, and carrying passengers, as now we have to go over this route at high water. It would be a great benefit to this entire section of Camden and Glynn Counties. I make regular trips through these waters and know the condition of these shoals and know that the people in my community would greatly appreciate any assistance the Government would render in giving us a 3-foot depth at low tide." (C. B. Moody.)

"I am in the towboat business, and my business demands frequent use of the waters in this creek. I find myself bothered in not being able to pass over these shoals when the tide is low, and it will benefit everybody who travels or ships freight through this channel if improvement is made." (J. G. Pittman.)

"We are engaged in the towing and lighterage business and work a great deal through this creek, but as we can go through only at high water, it bothers our business a great deal." (Thos. P. Flinn & Co.)

"I am operating a passenger and freight boat through the waters of Fancy Bluff Creek. My passenger list is generally large and my freight also. We are troubled a great deal in having to wait on the tides so as to cross the shoals in this creek. If the shoals are removed it would be a great advantage to my business as well as to others towing through this creek." (R. F. Atkinson.)

"I am of the firm of G. B. Smith & Co., operating piling and naval stores, and do our boating largely through the waters of Fancy Bluff Creek. On account of the shoals in this creek, freight traffic is greatly hampered." (G. B. Smith.)

"I beg to say that I haul through Fancy Bluff Creek, in this harbor, something over $1,500 in merchandise freight besides $250 worth of cordwood and crossties per month in addition to my regular passenger service both ways. We are compelled to do this traffic on high water on account of the shoals in this creek. If these shoals could be removed to a depth of 3 feet at low water, it would greatly facilitate traffic." (F. D. Scarlott.)

4. The above shows that there are quite a large number of craft engaged in hauling freight from the Little Satilla River to Brunswick. So that any improvement made would be for the benefit of the public generally. The type of craft using the waterway are mostly gasoline launches towing barges or the rafting of timber and lumber, and a depth of 3 to 4 feet at mean low water will accommodate this type of craft by taking advantage of the tide.

5. A sketch map is transmitted showing the location of the waterway in question and also the alignment of the creek itself. It would appear that the work required to be done in order to obtain 3 feet at low water would be the deepening of another thousand feet of the creek from 1 to 3 feet. The cost of making this improvement would be nominal, probably not exceeding $4,000. The cut that was made some five years ago is in as good condition at this time as it was when the work was done, showing that the tidal flow through the creek is favorable for maintaining a channel, if once accomplished; so that the estimated cost of maintenance of the improvement sought would be very small. In fact, it is believed that if a section of sufficient size was obtained, tidal flow through the creek would enlarge the cut rather than produce shoaling.

6. Fancy Bluff Creek might be considered a tributary of Brunswick Harbor, and if a further examination shows that the improvement can be made at a reasonable cost, commensurate with the benefits to be derived, the improvement of this waterway may be thrown into the improvement of Brunswick Harbor and be maintained from the funds allotted for the maintenance of Brunswick Harbor.

7. The location of terminal and transfer facilities are at the port of Brunswick. Public wharves are kept up at this port for the use of just such boats as are used on the waterway in question and are fully adequate and efficient for the traffic.

8. The development and utilization of water power for industrial and commercial purposes do not enter into this improvement at all.

9. The present and prospective commercial importance of the locality in question appears to warrant an improvement of this waterway. There appears to be a sufficient depth of water through Fancy Bluff Creek, with the exception of 1,000 feet or so at the headwaters of the creek and of the cut connecting the creek with Little Satilla River. An examination of this waterway shows that the improvement desired can be obtained without difficulty and at moderate cost, and it is recommended that a further survey of Fancy Bluff Creek be made, in order to make an estimate for obtaining an improvement that would meet the needs of navigation.

Very respectfully,

E. R. CONANT,
Assistant Engineer.

Col. DAN C. KINGMAN,
Corps of Engineers.

SURVEY OF FANCY BLUFF CREEK, GA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Savannah, Ga., January 6, 1913.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Survey of Fancy Bluff Creek, Ga.

1. There is submitted herewith the following report on the survey of Fancy Bluff Creek, connecting Brunswick Harbor with the Little Satilla River, Ga., which was ordered by the river and harbor act approved July 25, 1912.

2. The survey was made by Assistant Engineer W. C. Lemen, and his report is transmitted herewith. He describes in detail the methods adopted and gives the results obtained. These results are exhibited on a single sheet, which shows the locality on a large scale, with a suitable index to show its relation to other bodies of water.

3. The connection of Fancy Bluff Creek and Little Satilla River was made artificially by local authorities, with the consent of the War Department, about the year 1907. A very small cut was made, which afforded a passage for light-draft boats at the higher stages of the tide. This route is very convenient to persons living along the Little Satilla River, for it puts them in water connection with Brunswick, the nearest deep-water harbor in the State.

4. The country tributary to this route is agricultural and timber-producing. It is being rapidly settled up and undoubtedly will produce much greater quantities of material for shipment than it does at present. The articles transported through the cut during the past two years were mainly forest products and had a value of about $75,000 a year. In addition, there were about 14,000 passengers carried. If the cut was widened and deepened so as to afford a dependable route at all stages of the tide, its use would be much more frequent and its value proportionately greater.

5. Assistant Engineer Lemen submits an estimate for a cut 4 feet deep, at ordinary low water, having a bottom width of 20 feet. I think this is too narrow. It would hardly be possible to excavate it except with some kind of a boom dredge, which would cast the material to one side, depositing it on the bank of the cut. This arrangement is always objectionable in making canals through soft marshes. The weight of the added material is apt to cause the bottom of the canal to rise or else the bank to slide outward into the channel. I should advise a cut 4 feet deep and with a bottom width of about 50 feet. By following the best water and not attempting to straighten the channel too much, such dimensions can be obtained by the removal of about 50,000 cubic yards of material. If this was done by contract, the cost would probably be from 20 to 25 cents per cubic yard; but it is believed that one of the small 10-inch suction dredges belonging to the district will be available for such work during the coming year and can do all that is necessary at this place at a cost not to exceed $8,000. It is believed that this waterway is worthy of an expenditure of this amount, and such an appropriation is recommended.

6. Owing to tidal conditions, there is a slight tendency to scour in the existing cut, which would probably be increased in the larger one, and the cost of maintenance will undoubtedly be very small, if it amounts to anything at all.

7. The city of Brunswick maintains free wharves for the use of boats using this route, and there are suitable wharves and landing places along the route itself. There are no questions of drainage or water power connected with the project.

DAN C. KINGMAN.

[For report of the Board of Engineers for Rivers and Harbors on survey see page 2].

REPORT OF ASSISTANT ENGINEER W. C. LEMEN.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., December 21, 1912.

From: W. C. Lemen, Assistant Engineer.
To: Col. Dan C. Kingman, Corps of Engineers.
Subject: Survey of Fancy Bluff Creek.

1. The following report is submitted upon the survey of Fancy Bluff Creek, connecting Turtle River and Brunswick Harbor with Little Satilla River, Ga., the preliminary examination of which is called for in the river and harbor act approved July 25, 1912.

2. The preliminary examination of this project was forwarded from Savannah under date of September 5, 1912, approved by the board of engineers under date of September 23, and a survey ordered of same under date of September 28, 1912.

3. *Location.*—Fancy Bluff Creek enters Brunswick Harbor by way of South Brunswick River, which flows into the western side of Turtle River on the extreme western portion of Brunswick Harbor. The mouth of Fancy Bluff Creek is approximately 5½ miles from the main docks and terminals of the port of Brunswick, located on East River. This creek, in conjunction with the artificial cut at its upper end, joins South Brunswick River with Little Satilla River. The latter river rises in the western portion of Camden County and flows into Jekyl Sound, an arm of St. Andrews Sound, and is mainly an estuary of the sea, with very little drainage basin, but affords a waterway above the point where Fancy Bluff Cut enters the same, about 15 miles in length. This cut enters Little Satilla River about 9 miles from its mouth, or its entrance into Jekyl Sound.

4. *General characteristics.*—Fancy Bluff Creek is a salt-water creek, flowing between what is termed Colonels Island and Fancy Bluff Point, varying in width from 400 feet at its mouth to 75 feet at its upper end, with depths from zero to 18 feet. For the most part it runs through salt-water marsh, but abuts highlands at two points on Colonels Island side and Fancy Bluff Point side at three places. It is connected with Little Satilla River by a cut approximately 80 feet wide at low water, with side slopes of 1 on 3, which was dredged to about mean low water. The opening of this canal or cut-off was done by the county commissioners of Glynn County about five years ago, and its accomplishment shortened the distance for all users of the Little Satilla River by about 16 miles, this being the distance saved in reaching the port of Brunswick. Formerly, in order to reach Brunswick, this commerce had to go down to the mouth of Little Satilla River, through Jekyl Sound, and back up through Jekyl Creek and Brunswick River, consequently very little exchange of freights existed.

5. *Character of survey.*—The skeleton of the survey of this creek is a short system of triangulation for the lower end, combined with a traverse line on the upper end, the coordinates of which are an extension of the Brunswick Harbor triangulation system, all points being referred to St. Simons Lighthouse as a center of coordinates. Azimuths are given from true meridian within the limits of the methods of work. No correction, however, has been made to the true azimuth as determined at St. Simons Lighthouse for the convergency of the meridians in this amount of westing. Seven stations were located by triangulation and nine by the traverse lines. Sounding lines were run across the creek, varying in distance apart from 100 to 200 feet, the sounding boat being located each minute by double intersections from two stations of the skeleton. The elevations of the adjacent marsh and bluff lines were determined from notes taken during the survey, either by the distance above the water surface or by an instrumental level line. The woods line showing the division between the marsh line and the high land was instrumentally located in a general way.

6. *Tidal data.*—In order to determine the mean low-water plane, the readings of high and low water for 16 consecutive days were observed on a gauge set at the wharf at Fancy Bluff Landing in conjunction with simultaneous readings from a gauge referred to the known low-water plane in Brunswick Harbor and by a comparison of these gauge readings the elevation of the mean low-water plane deduced.

7. The mean of 30 high-water readings on the Fancy Bluff gauge is 7.50 feet, and the mean of 30 low-water readings is 0.00 foot, giving a rise and fall for the period observed of 7.50 feet. Brunswick Harbor gauge for the same period

gave a mean high-water reading of 7.39 feet, which is 104.8 per cent above a normal rise and fall, and which, applied to the observed rise and fall at Fancy Bluff, gives a mean rise and fall at that point of 7.16 feet. This is 0.1 foot greater than the mean rise and fall for Brunswick Harbor. For the same period Brunswick Harbor gauge gives a low-water reading of 0.47 foot above normal, which will give a low-water reading upon the Fancy Bluff gauge of 0.52 foot, allowing 0.05 foot for half the difference in the rise and fall between the two localities; therefore the readings on the Fancy Bluff gauge are deduced to be 0.52 foot above the local mean low-water plane for the period the gauge was observed—namely, from October 22 to November 6, inclusive—and this correction has been applied to the gauge in the deduction for sounding work and elevations given on the maps.

8. All elevations of banks and highlands are referred to this mean low-water plane. Two additional gauges were set from the primary gauges at Fancy Bluff—one at station No. 7 in the upper portion of the creek, and the other in Little Satilla River at the mouth of the cut. The elevation of the zero of these gauges was determined by an instrumental level line.

9. *Levels.*—In conjunction with the traverse line, a system of compensating levels was carried from the Fancy Bluff Creek gauge up to the upper portion of the creek and across the neck to Little Satilla River. An additional line of levels was run from a point on the creek across the highlands to Little Satilla River (where the two creeks are approximately 1,700 feet apart), with a view of determining the practicability of placing a cut at this point. The elevations of this ground are shown upon the map.

10. *Maps.*—All data have been plotted to a scale of 1:2000 in the shape of a working drawing in two sheets. The portion of the creek wherein no improvement work is necessary has been reduced to a scale of 1:5000, and the part wherein improvement is recommended traced from the working drawing, all being placed upon one sheet, of regulation size. The axis of the cut proposed to be made is shown upon the portion plotted to a scale of 1:2000.

11. *Obstructions, artificial.*—No artificial obstructions exist across the waterway.

12. *Obstructions, natural.*—The only natural obstructions to the free use of this waterway are the shoals existing at the upper end of the creek and through the artificially formed cut between the creek and Little Satilla River. No snags nor overhanging trees are encountered.

13. *Past, present, and prospective commerce.*—The lands adjacent to Little Satilla River and Fancy Bluff Creek are both agricultural and timber producing, and have always mainly sought the port of Brunswick for a shipping point and port of exchange. This country, approximately 150 square miles in extent, is steadily increasing in population and productiveness, especially in agricultural products, and naturally seeks the port of Brunswick for a trading point. The main portion of the above country uses the Little Satilla River for shipments, on account of the distance out to the railroad connections to the west of them, and in order to reach Brunswick, prior to the formation of this cut, had to go down to the mouth of the Little Satilla River, across Jekyl Sound, back up through Jekyl Creek, and through Brunswick River to the city. This route was costly, and in the case of heavy weather impassable. The opening of the cut between the creek and Little Satilla River to a mean low-water depth in 1907 enabled small crafts to pass through at from half tide or more, and by this improvement commerce was very materially increased.

14. Taking the report for the last two years, an average of approximately $75,000 worth of commerce has passed through this creek in the shape of crossties, and lumber in the form of rafts, and naval stores, and the return miscellaneous merchandise. During the year 1911, 14,600 passengers were carried upon small craft to and from Brunswick through the Fancy Bluff Cut.

15. By the deepening of this cut so as to afford a low-water depth of 4 feet, the consequent delay that is now encountered, due to the cut going dry at low water and the necessity of waiting sometimes as long as six hours, interfering thereby very seriously with the commerce, will be eliminated, and it is anticipated that by the accomplishment of this improvement this commerce will be at least doubled in the near future.

16. *Terminal and transfer facilities.*—The city of Brunswick now maintains municipal wharves at the foot of two separate streets for the accommodation of miscellaneous traffic from Fancy Bluff, Little Satilla River, and adjacent waterways. The wharves at the foot of these streets are equal in accommodation to other wharves found along the city front. If, however, these two

wharves prove inadequate in the future, the question of further transfer facilities will be met by active steps now being taken by the city of Brunswick to acquire some 400 feet of wharf frontage on East River, upon which it is contemplated to construct a municipal wharf of such size as commerce warrants.

17. Small wharves are found at four localities along the affected route, namely, at Fancy Bluff, on the creek, Half Moon Landing, Spring Bluff, and Yankee Landing, on the Little Satilla River. Other loading points are available and used, but no special wharves exist at present.

18. *Water power.*—Owing to the character of this waterway (a tidal estuary) the question of water power can not be considered.

19. *Improvements recommended.*—In view of the considerable commerce making use of this wterway, and of the consequent delays and disadvantages that the same suffers through lack of sufficient depth to navigate the same at all times, it is recommended that the present existing cut from Little Satilla River, in Fancy Bluff Creek, be enlarged so as to have a bottom width of 20 feet with side slopes of 1 on 4 and a depth of 4 feet at mean low water, and that the entrance to the same from Francy Bluff Creek be straightened, as shown on the map, and the creek as far down as the same lacks the above-described cross section and depth be improved to the same cross section as that of the cut.

20. The amount of material necessary to be removed in order to accomplish this improvement is shown in the detail below:

	Cubic yards.
Deepening and enlarging cut, 1,600 feet in length, to a 4-foot depth	18,000
Straightening and deepening east entrance, 500 feet in length, to 4-foot depth	7,000
Deepening Fancy Bluff Creek for 900 feet to 4-foot depth	3,000
Overdepth for this total length	4,000
Total	32,000

Estimated cost of above, $6,600, subdivided as follows: Dredging, $6,000, and 10 per cent added for contingencies, $600. No additional plant is necessary, as it is recommended that same be done under contract.

21. The preliminary report suggests that an investigation into the feasibility of making a new cut across the neck of land at point marked "X–Y" be made. The approximate length of such a cut would be 1,600 feet, and if dredged to 4 feet below mean low water, with a bottom width of 20 feet, side slopes 1 on 2, would mean the removal of 60,000 cubic yards, taking the mean height of the land to be 14 feet above low water. This land is covered with a light growth of pine and scrub hardwood, the removal of which would add probably 20 per cent to the usual cost of such work, so that this cut would cost approximately $15,000 to accomplish. In addition to this there would be the cost of a right of way. The improvement in the preceding paragraph is therefore considered more economical and involves no special right of way.

22. *Maintenance.*—Owing to the fact that since this cut was first opened it has increased in depth a small amount, and also that the flow through Fancy Bluff Creek will probably be materially increased by the further opening of the cut in Little Satilla River and the enlargement of the cross section of the upper portion of the creek, it is thought that no deterioration will result after the work is once accomplished.

W. C. LEMEN.

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1351.

PORT ORFORD HARBOR, AT GRAVE YARD POINT, OREG.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF PORT ORFORD HARBOR, AT GRAVE YARD POINT, OREG., WITH A VIEW TO IMPROVING THE SAME FOR THE ESTABLISHMENT OF A HARBOR OF REFUGE.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 5, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Capt. H. H. Robert, Corps of Engineers, dated November 12, 1912, on preliminary examination of Port Orford Harbor, at Grave Yard Point, Oreg., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 4, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Port Orford Harbor, at Grave Yard Point, Oreg.

1. There is submitted herewith, for transmission to Congress, report dated November 12, 1912, by Capt. H. H. Robert, Corps of Engineers,

as authorized by river and harbor act approved July 25, 1912, on preliminary examination of Port Orford Harbor, at Grave Yard Point, Oreg., with a view to improving the same for the establishment of a harbor of refuge.

2. Port Orford Harbor is an open roadstead on the coast of Oregon about 50 miles north of the Oregon-California State line, and is about midway between San Francisco Bay and Strait of Juan de Fuca. A number of previous examinations of this locality have been made, and the river and harbor act of March 3, 1879, appropriated $150,000 for commencing the construction of a breakwater and harbor of refuge at some point to be selected between the Strait of Juan de Fuca and San Francisco. The several Boards of Engineers having the matter under consideration at different times have all selected Port Orford as the most suitable point for a harbor of refuge, and the board appointed in 1890 estimated that the project would involve an ultimate expenditure of about $8,000,000. No additional appropriations were made by Congress and no work was done.

3. The cost of a breakwater at Grave Yard Point would be somewhat less than at other localities considered in earlier reports, but the protected area would be smaller, and its value to commerce correspondingly less. The commerce of the Pacific coast has increased in recent years, and a further increase in the future may be confidently expected. Having these facts in mind, the district officer nevertheless believes that the benefits to be expected from the proposed harbor of refuge would be incommensurate with the large cost of constructing the breakwater, and he is therefore of opinion that the locality is not worthy of improvement by the General Government. In this opinion the division engineer concurs.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 16, 1912, concurring with the views of the district officer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Port Orford Harbor, at Grave Yard Point, Oreg., with a view to improving the same for the establishment of a harbor of refuge in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

6. Attention is invited to another report by this office under date of February 4, 1913, upon this same harbor, including consideration of any proposition for cooperation on the part of local interests, also considered inadvisable at the present time. (H. Doc. 1352, 62d Cong., 3d sess.)

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 16, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. This harbor or roadstead, about midway between San Francisco Bay and Straits of Juan de Fuca, is protected by a high point of land from the west and northwest storms but is open to the south and southwest. It is a good summer roadstead but can be used in winter only in favorable weather. A number of examinations, surveys, and estimates have heretofore been made in connection with the contemplated improvement of this harbor, and these are described herein by the district officer, but no work of construction has been undertaken.

2. The population of the village of Port Orford is from 150 to 200, and the number of business enterprises are correspondingly small. There are no regular steamer lines to Port Orford, most of the ocean freight being hauled overland from Coos Bay or Coquille River, but occasionally a vessel stops. The receipts of merchandise are given as 700 to 1,000 tons and the exports 500 to 1,000 tons. The population of the whole county in which Port Orford is situated is about 3,000.

3. In October, 1911, a special election was held with a view to the establishment of a port of Port Orford. Much opposition developed, but the law was passed by a small majority and a commission of five members was appointed by the governor of the State. The validity of the port, however, has been attacked, and its determination is now in the courts.

4. The establishment of a harbor of refuge by improvements at Grave Yard Point proper would involve the construction of a breakwater from said point for a length of 3,000 to 3,500 feet. Such a breakwater would fully protect an area of not more than 95 acres and protect fully and partially 112 acres. The entrance would be narrow and dangerous of approach. Any reduction of the length of the breakwater to increase safety of entrance would carry with it a corresponding reduction in the extent of protection afforded. By a modified location, as suggested by the district officer, the protected area might be increased about 11 acres.

5. The district officer states that the limited area that could be protected properly by a breakwater constructed from Grave Yard Point or in the immediate vicinity thereof would be too small to be considered as a harbor of refuge for the Pacific coast, and that if so constructed the harbor would be very little used by navigation. Former reports considered a more extensive protection by longer breakwaters located in deeper water. The cost of constructing a breakwater from Grave Yard Point would be less than the estimates heretofore made, but it would still be large.

6. The district officer expresses the opinion, in which the division engineer concurs, that Port Orford Harbor, at Grave Yard Point, Oreg., is not worthy of improvement by the General Government with a view to the establishment of a harbor of refuge.

7. Interested parties were informed of the unfavorable report of the district officer and given an opportunity of submitting their views

to the board, but no communications on this subject have been received.

8. The amount of commerce at Orford being quite small, the importance of a harbor of refuge at this point must be gauged by its value to the passing commerce on the Pacific coast. This has been increasing in recent years, and a further increase may be confidently expected.

9. A study of conditions at this harbor indicates quite clearly that the protection afforded by a breakwater built out from Grave Yard Point would be quite small, would not afford a harbor of national importance, and would be dangerous of approach. The cost of a harbor of refuge of larger scope has been estimated in previous reports in amounts ranging from approximately $3,000,000 to $10,000,000. The need of a harbor of refuge at this locality has not been made manifest. There is nothing in the report of the district officer to indicate such a need, and although many steamship companies and transportation organizations were given an opportunity of submitting statements and arguments bearing upon the necessity of a harbor of refuge, the opportunity has not been availed of, indicating a lack of interest in the subject.

10. Believing that the benefits to general commerce and navigation to be derived from a harbor of refuge as contemplated in the act would not be commensurate with the cost, the board reports that in its opinion it is not advisable for the United States to undertake the improvement of Port Orford Harbor, at Grave Yard Point, Oreg., with a view to improving the same for the establishment of a harbor of refuge.

11. In compliance with law the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF PORT ORFORD HARBOR AT GRAVE YARD POINT, OREG.

United States Engineer's Office,
Portland, Oreg., November 12, 1912.

From: Capt. H. H. Robert, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination, Port Orford Harbor at Grave Yard Point, Oreg.

1. I have to submit the following report on a preliminary examination of Port Orford Harbor, made under my direction in accordance with the river and harbor act, approved July 25, 1912, and department letter, dated August 3, 1912.

2. The wording of the act is as follows:

> Port Orford Harbor, at Grave Yard Point, Oreg., with a view to improving same for the establishment of a harbor of refuge.

3. The same river and harbor act contains an item for "Port Orford Harbor, Oreg., including consideration of any proposition for cooperation on the part of local interests," on which a separate report has been submitted. From consideration of this fact, as well as previous reports on this locality, it is assumed that the present report should cover the formation and use of a harbor of refuge by extensions from vicinity of Grave Yard Point of the protection already afforded by nature in such manner as will be most useful, not only for shipping involved in local commerce, but for any vessels passing within reach of same.

4. *Description of harbor.*—Port Orford Harbor is an open roadstead on the coast of Oregon, about 50 miles north of the Oregon-California State line, and is about midway between San Francisco Bay and Straits of Juan de Fuca. The harbor is about 7 miles south of Cape Blanco, which is the most westerly point of land south of Cape Flattery, Wash. The coast line here makes an abrupt turn to the east and northeast for about 1 mile, and the harbor is formed by a high point of land making out to the southwest. This point of land, which is about 350 feet high, protects the harbor from the west and northwest storms. Port Orford is said to be the best summer roadstead between Point Reyes and Straits of Juan de Fuca. It is open to the south and southwest, and in winter can only be approached in favorable weather.

5. The mean rise and fall of the tide is about 5 feet, and the greatest difference between higher high water and lower low water of one day is about 11 feet.

6. The following extract from a former report gives a concise description of certain conditions in this locality:

> The prevailing winds on the coast from November until April are from the south and southwest; in May they veer around to the north and northwest and continue from that direction until about October; the gales most dreaded by mariners are from the southwest, and are at times fearful in their severity; on the whole of this northwest coast between San Francisco and the Strait of Juan de Fuca there is no harbor that a sailing vessel will attempt to enter during a heavy southwest gale.

7. *Former examinations.*—The earliest examination of this harbor was made in the fall of 1872 by Maj. H. M. Robert, Corps of Engineers, who in 1873 presented a report with plans and estimates for a breakwater. (See Annual Report, Chief of Engineers, 1873, Appendix Y.)

8. In 1876 a board of engineers for the Pacific coast made a similar examination, and in 1877 presented a report with plans and estimates. (Report of Chief of Engineers, 1877, Appendix JJ 5.)

9. In 1878 Maj. John M. Wilson made a survey and estimates for a breakwater. (See Report of Chief of Engineers, 1879, Appendix KK 8, and Senate Ex. Doc. No. 14, 45th Cong., 3d sess.)

10. The river and harbor act of March 3, 1879, appropriated $150,000—

> for the commencement of the construction of a breakwater and harbor of refuge at such point on the Pacific Ocean between the Straits of Juan de Fuca and San Francisco, Cal., as may in the opinion of a majority of the Board of United States Engineers for the Pacific coast be most suitable, the interests of commerce, local and general, being considered.

The Board of Engineers for the Pacific coast submitted a report, dated March 6, 1880. (See Ex. Doc. No. 188, 46th Cong., 2d sess., and Appendix PP, Chief of Engineer's Report, 1881.) The majority of the board selected Port Orford as the most suitable point for a harbor of refuge.

11. In compliance with a resolution of the Senate, February 19, 1881, the Board of Engineers for the Pacific coast submitted a supplementary report, in which the majority of the board adhered to its former selection of Port Orford as a point most suitable for a harbor of refuge. (See Senate Ex. Doc. No. 59, 46th Cong., 3d sess.)

12. No actual construction work on a breakwater was done. The sum of $8,626.92 from the $150,000 appropriated was expended on surveys and examinations, and the balance ($141,373.08) was held until further appropriation was to be made. The Senate resolution dated January 25, 1886, directed the Secretary of War to report to the Senate what disposition, if any, was made of the $150,000 appropriated by Congress for the construction of a breakwater at Port Orford, Oreg., by the act approved March 3, 1879. In reply a copy of the Board of Engineer's report was submitted. (See Senate Ex. Doc. No. 63, 49th Cong., 1st sess.)

13. The river and harbor act of September 19, 1890, required a reexamination of the harbor at Port Orford, Oreg., with a view to minimizing the project and estimates to reduce the original estimate of the cost. (See House Doc. No. 56, 51st Cong., 2d sess.)

14. The river and harbor act of August 18, 1894, provided for a survey at Port Orford, Oreg.—

with a view to improving the same for shipping purposes and as a harbor of refuge, commencing at Grave Yard Point and by jetty, sea wall, or other proper construction extending southerly or southeasterly into the ocean 300 or more feet, if necessary, and suitable for vessels of middle draft; and secondly, if necessary, by another jetty, sea wall, or other constructive work extending from the next high point or headland southwesterly 400 or more feet so as to accommodate vessels of maximum draft.

15. In compliance with the above, Capt. Thos. W. Symons, Corps of Engineers, submitted a report with plans and estimates for wharf at Grave Yard Point to cost either $168,366 or $203,366, depending on the amount of enrockment and a wharf at Nellys Point to cost $195,888 or $308,388, depending on amount of enrockment. (See House Doc. No. 313, 53d Cong., 3d sess.)

16. The river and harbor act of June 3, 1896, called for a survey of Port Orford Harbor, Oreg., with estimate of cost of improvement and importance to shipping and commerce. This was reported upon by Capt. W. L. Fisk, January 7, 1898, with the opinion that on account of the small value of commerce, past, present, and prospective, as compared with the enormous cost of adequately protecting the harbor, Port Orford Harbor was not worthy of improvement by the United States. (See House Doc. No. 247, 55th Cong., 2d sess.)

17. *Present conditions.*—The village of Port Orford has changed but little since the report of Capt. Thos. W. Symons in 1894 (House Doc. No. 313, 53d Cong., 3d sess.) The commercial industries are also about the same as in 1895. The population in 1895 was given as about 200 and in 1912 is from 150 to 200.

18. The village, which is situated on the high ground overlooking the open water to the south, was laid out as shown on the accompanying map but has never been incorporated, no street work has been done, and no streets have been dedicated to the public. The buildings are mostly old.

19. There are no regular steamer lines to Port Orford. Southbound steam schooners stop occasionally to pick up a load of shingles and ties after loading to 12-foot draft at Bandon, Oreg. Most of the ocean-going freight for Port Orford is shipped to Coos Bay or Coquille River and transported overland to Port Orford by team, or by ocean with gasoline launches.

20. There is one wharf at Port Orford which was constructed over 20 years ago and is still in fair condition though few repairs have been made.

21. The following commercial statistics for the past three years were obtained from the wharf agent at Port Orford. There are no records and the quantities and values given are approximate only, and probably a maximum.

Imports.

General merchandise including farm machinery, estimated:	Tons.
1910	1,000
1911	1,000
1912 (to September)	700

Exports.

Articles.	1910		1911		1912 (to September).	
	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.
Ties.....tons..	35	$8,000	52	$12,000	44	$10,000
Shingles.....do....	250	5,000	500	12,500	250	8,750
Matchwood.....do....	448	1,000	336	900	112	400
Wool.....do....	10	4,000	12	5,000	12	6,000
Hides.....do....	40	1,400	40	1,400	40	1,400
Butter.....do....	40	20,000	50	25,000	30	18,000
Miscellaneous.....do....	50	12,000	50	12,000	40	10,000

22. The underwriters insure vessels for this port from April 1 to October 1 only. It is estimated that there are about 25 arrivals and departures of steamers during the above season. In addition to the above an average of about 2 gasoline launches call at the port weekly.

23. Before the San Francisco earthquake a steamer line between San Francisco and Port Orford called on an average once monthly.

24. Curry County has an area of about 1,500 square miles, most of which is mountainous. Its population was about 1,500 in 1890 and is estimated at 3,000 in 1912. Owing to lack of transportation facilities development has been slow. The county has an ocean frontage of about 70 miles, along which Port Orford furnishes the only deep-water harbor. There are no railroads in the county, though surveys have been made for same. But few wagon roads exist. It is estimated that about 6,000,000,000 feet of standing timber, consisting of fir, white cedar, and spruce, is scattered throughout the county. There are no very large areas of this, as the county was swept by fire, which killed a considerable portion of its supply. The fire-killed white cedar is used for ties and shingles. There are several sawmills in the county.

25. Gold is mined along the beaches on the Sixes, Chetco, and Rogue Rivers. It is estimated that about $50,000 is taken out annually.

26. Dairying and stock raising are the principal farming industries of the county. Fruit raising has not been developed to any considerable extent. There are several rock quarries. The principal quarries are located, one near Pistol River and one at Blacklock Point, about 8 miles north of Port Orford.

27. Other villages in the county than Port Orford are Langlois, with population of about 200, and Wedderburn, Agnes, and Harbor, with populations of about 100 each, also Gold Beach, the county seat, with a population of 150.

28. *Port of Port Orford.*—In October, 1911, a special election was held with a view to the establishment of a port of Port Orford. The limits considered inclose an area of about 321 square miles, beginning at the mouth of Euchre Creek and extending to the Coos County line. The northern boundary is about 16 miles north of Port Orford Harbor and the southern boundary about 14 miles south of same. The principal resources of the area included are lumber and dairy products. Its lumber is estimated at about 1,500,000,000 feet, consisting principally of fir, but with a considerable quantity (about 150,000,000 feet) of Port Orford cedar.

29. The bulk of the timber of the port is held by a large corporation operating on Coos Bay, and it is understood that their timber will be hauled to Coos Bay, where they operate a large sawmill. The greater part of the timber is situated quite a distance from the port, and will involve a considerable haul, and it is therefore uncertain how much of the timber would reach Port Orford. Most of the dairy interests are on the coastal plain north of the port and might find an easier outlet.

30. Much opposition developed outside of the village of Port Orford to the establishment of the port, and a very small majority of the votes favored same. A port commission of five was appointed by the Governor of Oregon. The validity of the port as established has been attacked by former opponents to same, and such complications have arisen that the matter of its legality will probably not be settled for some months at least.

31. *Historical résumé.*—The following historical résumé is taken from previous reports on the subject hereinbefore referred to, the location being shown on the map submitted herewith. In 1873 Maj. H. M. Robert, Corps of Engineers, submitted plans and estimate for harbor of refuge at Port Orford which contemplated the construction of a breakwater starting from vicinity of headland forming the western boundary of Nellys Cove and at about 100 yards from its extremity, this interval of 100 yards being left to provide for circulation and guard against the harbor's shoaling with sand. The length proposed was 1,500 feet at first, with proposed future extension to 4,500 feet. In 1877 the Board of Engineers for the Pacific Coast, consisting of Lieut. Cols. Alexander, Williamson, and Stewart, and Maj. Mendell, prepared the second plan and estimate for Port Orford as a harbor of refuge. The location of the breakwater proposed by this board was for an auxiliary structure to connect Tichenors Rock with the headland just north of it, and about 500 feet distant, and for the main breakwater to begin about 1,000 feet east of the south end of this auxiliary structure and extend almost due east for about a mile.

32. In 1878 the third plan and estimate for a harbor of refuge at Port Orford was prepared by Maj. J. M. Wilson, Corps of Engineers. He proposed to start his breakwater from the southerly shore of the headland just north of Tichenors Rock, leaving an opening for circulation, and extending in an easterly direction for 2,000 feet at first, with a later extension to 5,000 feet.

33. The fourth plan and estimate for Port Orford as a harbor of refuge was made in 1880 by a board of engineers consisting of Lieut. Cols. Stewart, Williamson, and Mendell, and Maj. Gillespie. This proposed breakwater starts in about 50 feet of water at a point about 1,000 feet south of Nellys Point and about 800 feet east from the main shore and extends in an easterly direction about 4,000 feet.

34. In 1890 a board of engineer officers consisting of Col. Mendell, Maj. Handbury, and Capt. Symons, Corps of Engineers, in reporting on a reexamination of the harbor at Port Orford, with a view to minimizing the projects and estimate of proposed expenditure at that point, stated as follows:

> The board has arrived at the unanimous conclusion that neither as regards location, direction, or length can the breakwater adopted by the Board of Engineers in 1880 be changed in any manner so as to reduce the cost and still have it perform the functions which it was designed to fill, namely, of making a harbor of refuge at Port Orford.

35. The following table summarizes the comparative estimates of the improvements above referred to:

	Length of breakwater.	Area fully protected.	Area fully and partially protected.	Estimated cost.	Estimated cost per acre for fully protected area.	Estimated cost per acre for fully and partially protected area.	Cost per linear foot of breakwater.
	Feet.	*Acres.*	*Acres.*				
Maj. H. M. Robert, 1873	1,500	35	88	$2,902,000.00	$82,914.28	$32,977.22	$1,984.66
Do	4,500	205	248	9,000,000.00	43,902.43	36,290.32	2,000.00
Board of Engineers, 1877	6,780	410	485	10,507,343.00	25,627.66	21,664.62	1,549.75
Maj. J. M. Wilson, 1878	2,000	34	136	3,427,000.00	100,794.11	25,198.52	1,713.50
Do	5,000	290	409	9,405,000.00	32,431.03	22,995.11	1,881.00
Board of Engineers, 1880	3,960	224	316	8,954,055.25	39,973.46	28,335.61	2,261.12
Board of Engineers, 1890	3,960	224	316	7,821,960.00	34,919.46	24,755.03	1,975.24

36. Complete description of the construction and cross section of the breakwaters proposed in the various reports above mentioned may be found in said reports. In general they may be said to consist of rubble mounds surmounted (except in the case of the board of 1880, and in that case by continuation of section with stones of 25 tons or more in weight) by masonry walls with special provision in the way of minimum limits set for the size of individual blocks of stone or concrete for the different parts of the breakwater, to correspond with the various degrees of exposure to which the different parts were expected to be subjected.

37. The changes in commercial and navigation conditions since the preparation of the reports previously cited may be generally stated as follows:

(*a*) A vast increase in amount of ocean commerce along the Pacific coast.

(*b*) The combined results of approaching completion of the Panama Canal, the present and proposed improved conditions of waterways, the extension of railroads throughout the Pacific coast region and consequent development of resources, give certain promise in the near future of great increase over the present amount in ocean commerce along the Pacific coast.

(c) There has been a great increase in the relative amount of commerce carried by steam vessels as compared with that carried by sailing vessels, as well as increase in size and power of the larger class of steamships used for the commerce in question.

38. *Proposed improvement.*—The establishment of a harbor of refuge by improvements at Grave Yard Point proper would involve the construction of a breakwater from said point and convex outward (that is, extending southeast, thence in an easterly direction parallel to general direction of wave crests) for a length of 3,000 to 3,500 feet, somewhat as shown on map submitted herewith. This would not give the whole length of breakwater parallel to the general direction of the crests of the waves against which it is to furnish protection. Such a breakwater would give an area of not more than 95 acres fully protected, 112 acres fully and partially protected, and would preclude an increase of area protected by simple extension of breakwater. Furthermore, the entrance width would be only about 1,200 feet, with a depth of 4 to 6 fathoms. It would afford at best a dangerous entrance for steam vessels during severe southerly storms and sailing vessels would hardly dare to attempt it on account of the lee shore and beam sea. Any reduction in length of breakwater to widen the entrance would carry with it a large reduction in area and extent of protection afforded.

39. Assuming the section BC of breakwater as fixed by the evident intent of the act under which this examination is made to consider the utilization of only that portion of the harbor easterly of Grave Yard Point, it would seem best to expend the amount that it would cost to construct the portion AB in constructing a section as BD in prolongation of the line BC, as this would have the advantage of increasing the fully and partially protected area by some 11 acres, of furnishing an additional available passage for vessels in good weather, and of admitting of some increase of protected area by simple extension of breakwater. It would have the disadvantage of being constructed in greater depth and in location not so advantageous for construction as AB.

40. Assuming the breakwater to be located in position CD, the maximum increase of protected area that can be obtained by extension in straight line is about 11 acres. Any attempt to include the highly desirable area between Nellys Point and Grave Yard Point demonstrates the desirability of some location for the original line CD at least out as far as the line EF. This location would approximate the conditions so far as construction as those covered by the former reports mentioned herein, but would afford considerably less protected area than these former projects.

41. An inspection of the accompanying map shows that the location of a breakwater constructed from the vicinity of Grave Yard Point lies in 6 to 8 fathoms of water, whereas the board of 1880 in reporting on the locality states as follows:

> It is in evidence before the board that waves break into combers in depths of 8 and even 10 fathoms of water. In consideration of this fact the board is of the opinion that the breakwater ought not to be placed in much less than 10 fathoms.

42. The cost of constructing the breakwater from the vicinity of Grave Yard Point would be considerably less per linear foot than

for the locations previously reported on, on account of the less depth of water involved. The length would be about 400 feet less than that proposed by the Board of Engineers of 1880 and 1890. The total and partially protected areas, however, would be only about one-third as great and the difference in cost of construction will by no means be commensurate with this difference in protected area, and the greatly lessened value as a harbor of refuge.

43. It is believed that the limited area that could be properly protected by a breakwater constructed from Grave Yard Point, or immediate vicinity thereof, would be too small to be considered as a harbor of refuge for the Pacific coast, and that if so constructed the protection afforded by same would be but very little used by navigation.

44. *Water power, terminal facilities, etc.*—There is no water power in the vicinity that can be coordinated with a harbor improvement at this point.

45. There are no public wharves at this place. The existing wharf is a small structure, built more than 20 years ago, and is held by private interests. It is only suitable for moderate-sized steamers. There are no mechanical appliances for handling freight at this wharf. The water front is held by private ownership and there is no public space available for wharves. One or two streets extend to the water front; they have not been dedicated to the public.

46. *Conclusion.*—It is my opinion that Port Orford Harbor at Grave Yard Point, Oreg., is not worthy of improvement by the General Government with a view to the establishment of a harbor of refuge.

HENRY H. ROBERT,
Captain, Corps of Engineers.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., November 14, 1912.

To the Chief of Engineers, United States Army, concurring in the views expressed by the district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see page 3.]

O

e Doc. No. 1351 ; 62d Cong., 3d Sess.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1352.

PORT ORFORD HARBOR, OREG.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF PORT ORFORD HARBOR, OREG., INCLUDING CONSIDERATION OF ANY PROPOSITION FOR COOPERATION ON THE PART OF LOCAL INTERESTS.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 5, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Capt. H. H. Robert, Corps of Engineers, dated November 12, 1912, on preliminary examination of Port Orford Harbor, Oreg., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 4, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Port Orford Harbor, Oreg.

1. There is submitted herewith, for transmission to Congress, report dated November 12, 1912, by Capt. H. H. Robert, Corps of

Engineers, on preliminary examination of Port Orford Harbo Oreg., including consideration of any proposition for cooperation o the part of local interests, as authorized by river and harbor ac approved July 25, 1912.

2. Port Orford Harbor is an open roadstead on the coast of Orego about 50 miles north of the Oregon-California State line, and i about midway between San Francisco Bay and Straits of Juan d Fuca. The district officer states that the village of Port Orford ha a population of about 150 to 200, and that its commercial industrie are about the same as in 1895. Its commerce by water as no reported amounts to less than 2,000 tons per annum. An effort ha been made to establish a port at this locality, and a port commissio of five members has been appointed by the governor of Oregon, bu it appears that the validity of the port has been attacked and settlement of the question can not be expected for some months at leas The improvement desired is the construction of a breakwater extending about 200 to 300 feet from Grave Yard Point. The port commission proposes to cooperate with the United States in this work an to bond the district in order to raise the necessary funds. In th opinion of the district officer the value to navigation of the protection that would be afforded by the short length of breakwater proposed by local interests or by the same in connection with any possible future extension thereof would not be at all commensurat with the large cost involved, even with assurance of cooperation o the part of local interests to the extent proposed by them (abou $43,000, estimated by the port at about 25 per cent of the tota cost). He therefore reports that in his opinion Port Orford Harbo is not worthy of improvement by the General Government at th present time. The division engineer concurs in the opinion of th district officer.

3. This report has been referred, as required by law, to the Boar of Engineers for Rivers and Harbors, and attention is invited to it report herewith, dated December 16, 1912, concurring with th views of the district officer.

4. After due consideration of the above-mentioned reports concur in general with the views of the district officer, the divisio engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report tha the improvement by the United States of Port Orford Harbor, Oreg. including consideration of any proposition for cooperation on th part of local interests, in the manner apparently desired by th interests concerned as described in the reports herewith, is no deemed advisable at the present time.

5. Attention is invited to another report by this office under dat of February 4, 1913, upon this same harbor, involving consideratio of a larger project, also considered inadvisable at the present time (House Doc. 1351, 62d Cong., 3d sess.)

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 16, 1912.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. This harbor or roadstead, about midway between San Francisco Bay and Straits of Juan de Fuca, is protected by a high point of land from the west and northwest storms, but is open to the south and southwest. It is a good summer roadstead, but can be used in winter only in favorable weather. A number of examinations, surveys, and estimates have heretofore been made in connection with the contemplated improvement of this harbor, and these are described herein by the district officer, but no work of construction has been undertaken.

2. The population of the village of Port Orford is from 150 to 200, and the number of business enterprises are correspondingly small. There are no regular steamer lines to Port Orford, most of the ocean freight being hauled overland from Coos Bay or Coquille River, but occasionally a vessel stops. The receipts of merchandise are given as 700 to 1,000 tons and the exports 500 to 1,000 tons. The population of the whole county in which Port Orford is situated is about 3,000.

3. By a small majority at an election in October, 1911, the port of Port Orford was created and a commission of five members has been appointed by the governor. It appears, however, that the validity of the port has been brought into court. A letter from the secretary of the port states that the improvement desired is a solid masonry sea wall extending out about 200 to 300 feet in a southeasterly direction from Grave Yard Point to protect the present shipping facilities; that the port bill authorizes the issue of bonds not to exceed 10 per cent of the assessed valuation of property in the district; and that the present commissioners are willing to bond the district to the extent of 2½ per cent of the assessed valuation of the property, providing the result of the quo warranto proceedings, at present pending, is favorable. The district officer states that it is not believed that the present port commission is now in a position to guarantee the bonds, and that the coming election may result in a commission the majority of which will not favor such a measure.

4. The district officer states that the protection that would be afforded by a breakwater of any type, constructed from Grave Yard Point 200 to 300 feet in length, would add but little to the present protected area, and that the value to navigation of the protection to be afforded by the breakwater proposed, or by any possible extension thereof, would not be at all commensurate under present and prospective conditions of commerce with the large cost of such protection. He expresses the opinion, in which the division engineer concurs, that Port Orford Harbor is not worthy of improvement by the General Government at the present time, even were cooperation on the part of the local interests assured to the extent proposed.

5. Interested parties were informed of the unfavorable report of the district officer and given an opportunity of presenting their

views to the board, but no communications on the subject have bee received.

6. It seems clear from the facts presented that neither present no reasonably prospective commerce is sufficient in volume or value t justify the improvement desired, with or without the cooperatio proposed by the port commission. The commerce is small and th probable cost of improvement large, and therefore the board report that in its opinion it is not advisable for the United States to ente upon the work.

7. In compliance with law, the board reports that there are n questions of terminal facilities, water power, or other related subject which could be coordinated with the suggested improvement i such manner as to render the work advisable in the interests o commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF PORT ORFORD HARBOR, OREG

United States Engineer Office,
Portland, Oreg., November 12, 1912.

From: Capt. H. H. Robert, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination, Port Orford Harbor, Oreg.

1. In compliance with river and harbor act approved July 25, 1912, and department letter dated August 3, 1912, I have to submit the following report on a preliminary examination of Port Orford Harbor, Oreg., made under my direction during the month of September, 1912.

2. The wording of the act is as follows: "Port Orford Harbor, Oreg., including consideration of any proposition for cooperation on the part of local interests."

3. The same act contains an item for "Port Orford Harbor, at Grave Yard Point, Oreg., with a view to improving same for the establishment of a harbor of refuge," on which there is submitted this date a separate report of preliminary examination.

4. *Description of harbor.*—Port Orford Harbor is an open roadstead on the coast of Oregon about 50 miles north of the Oregon-California State line and is about midway between San Francisco Bay and Straits of Juan de Fuca. The harbor is about 7 miles from Cape Blanco, which is the most westerly point of land, south of Cape Flattery, Wash. The coast line here makes an abrupt turn to the east and northeast for about 1 mile, and the harbor is formed by a high point of land making out to the southwest. The point of land, which is about 350 feet high, protects the harbor from the west and northwest storms. Port Orford is said to be the best summer roadstead between Point Reyes and Straits of Juan de Fuca. It is open to the south and southwest and in winter can only be approached in favorable weather.

5. The mean rise and fall of the tide is about 5 feet and the greatest difference between higher high water and lower low water of one day is about 11 feet.

6. The following extract from a former report gives a concise description of certain conditions in this locality:

> The prevailing winds on the coast from November until April are from the south and southwest. In May they veer around to the north and northwest and continue until about October. The gales most dreaded by mariners are from the southwest, and are at times fearful in their severity. On the whole of this northwest coast between San Francisco and the Straits of Juan de Fuca there is no harbor that a sailing vessel will attempt to enter during a heavy southwest gale.

7. *Former examinations.*—The earliest examination of this harbor was made in the fall of 1872, by Maj. H. M. Robert, Corps of Engineers, who in 1873 presented a report with plans and estimates for a breakwater. (See Annual Report, Chief of Engineers, 1873, Appendix Y).

8. In 1876 a Board of Engineers for the Pacific coast made a similar examination and in 1877 presented a report with plans and estimates. (Report of the Chief of Engineers, 1877, Appendix JJ 5).

9. In 1878, Maj. John M. Wilson made a survey and estimates for a breakwater. (See report of the Chief of Engineers, 1879, Appendix KK 8, and S. Ex. Doc. No. 14, 45th Cong., 3d sess.)

10. The river and harbor act of March 3, 1879, appropriated $150.000 for the commencement of the construction of a breakwater and harbor of refuge at such point on the Pacific Ocean between the Straits of Juan de Fuca and San Francisco, Cal., as may in the opinion of a majority of the Board of United States Engineers for the Pacific coast be most suitable, the interests of commerce, local and general, being considered. The Board of Engineers for the Pacific coast submitted a report dated March 6, 1880. (See Ex. Doc. No. 188, 46th Cong., 2d sess.) The majority of the board selected Port Orford as the most suitable point for a harbor of refuge.

11. In compliance with a resolution of the Senate, February 19, 1881, the Board of Engineers for the Pacific coast submitted a supplementary report in which the majority of the board adhered to its former selection of Port Orford as a point most suitable for a harbor of refuge. (See S. Ex. Doc. No. 59, 46th Cong., 3d sess.)

12. No actual construction work on a breakwater was done. The sum of $8,626.92 from the $150,000 appropriated was expended on surveys and examinations, and the balance ($141,373.08) was held until further appropriations were to be made. A Senate resolution dated January 25, 1886, directed the Secretary of War to report to the Senate what disposition if any was made of the $150,000 appropriated by Congress for the construction of a breakwater at Port Orford, Oreg., by act approved March 3, 1879. In reply a copy of the reports mentioned in paragraphs 7 to 11 above were submitted with statement from the Chief of Engineers as follows:

> The sum of $8,626.92 from the appropriation of March 3, 1879, was expended by the Board of Engineers in its surveys and investigations, and no disposition has been made of the balance ($141,373.08) for the reason stated in the Report of the Chief of Engineers for 1881, as follows:
>
> "It may be well to state that according to the estimates of the board an ultimate expenditure of about $8,000,000 will be involved in the complete establishment of the harbor in question. As it is evident that the expenditure of the amount now

available can not produce any beneficial results, it is proposed to withhold it till further appropriation is made. This course will be in the interests of economy an will not delay the final construction of the harbor."

13. The river and harbor act of September 19, 1890, required reexamination of the harbor at Port Orford, Oreg., with a view t minimizing the project and estimates to reduce the original estimat of the cost. (See H. Doc. No. 56, 51st Cong., 2d sess.) The Boar of Engineers appointed in accordance with the above-mentione provision made a reduction in the estimate without changing th plans.

14. The river and harbor act of August 18, 1894, provided for survey of Port Orford, Oreg.:

> With a view to improving the same for shipping purposes and as a harbor of refug commencing at Grave Yard Point and by jetty, sea wall, or other proper constructio extending southerly or southeasterly into the ocean three hundred or more feet, necessary, and suitable for vessels of middle draft; and, secondly, if necessary, b another jetty, sea wall, or other constructive work extending from the next high poin or headland southwesterly four hundred or more feet so as to accommodate vessels maximum draft.

15. In compliance with the above Capt. Thomas W. Symons, Corp of Engineers, submitted a report, with plans and estimates, for whar at Grave Yard Point, to cost either $168,336 or $203,366, dependin on the amount of enrockment, and a wharf at Nellys Point, to cos $195,888 or $308,388, depending on amount of enrockment. (Se H. Doc. No. 313, 53d Cong., 3d sess.)

16. The river and harbor act of June 3, 1896, called for a survey of Port Orford Harbor, Oreg., with estimate of cost of improvement and importance to shipping and commerce. This was reported upon by Capt. W. L. Fisk, January 7, 1898, with the opinion that on account of the small value of commerce, past, present, and prospective, as compared with the enormous cost of adequately protecting the harbor, Port Orford Harbor was not worthy of improvement by the United States. (See H. Doc. No. 247, 55th Cong., 2d sess.)

17. The present examination was made during the month of September, 1912.

18. The village of Port Orford has changed but little since the report of Capt. Thomas W. Symons in 1894. (H. Doc. No. 313, 53d Cong., 3d sess.) The commercial industries are also about the same as in 1895—1 daily stage line, with express and post office; 1 hotel, 1 feed stable; 1 general-merchandise store; 1 hardware store; 1 bank; 1 drug store; 1 newspaper; 1 carpenter shop; 1 boot and shoe shop; 1 barber shop; 1 church; 1 school; and 1 shingle mill. The population in 1895 was about 200 and in 1912 from 150 to 200.

19. The village, which is situated on the high ground overlooking the open water to the south, was laid out as shown on the accompanying map, but has never been incorporated; no street work has been done and no streets have been dedicated to the public. The buildings are mostly old. There is a daily stage line along the coast from Bandon, on Coquille River, through Port Orford to the south. The mail is brought in over the mountains by stage from Roseburg, Oreg.

20. There are no regular steamer lines to Port Orford. Southbound steam schooners stop occasionally to pick up a load of shingles and ties after loading to 12-foot draft at Bandon, Oreg. Most of the

ocean-going freight for Port Orford is shipped to Coos Bay or Coquille River and transported overland to Port Orford by team or by ocean with gasoline launches.

21. There is one wharf at Port Orford, which was constructed over 20 years ago and is still in fair condition, though few repairs have been made.

22. The charge for wharfage on this wharf is $1.50 per ton on general freight. A charge of $10 is made when a steamer ties up to the wharf; so vessels frequently anchor off the wharf and send in a small boat to take off passengers, and freight, if the quantity is small.

23. The following commercial statistics for this past three years were obtained from the wharf agent at Port Orford. There are no records, and the quantities and values given are approximate only, and probably a maximum:

Imports.

General merchandise, including farm machinery, estimated:	Tons.
1910	1,000
1911	1,000
1912 (to September)	700

Exports.

Articles.	1910		1911		1912 (to September).	
	Quantity.	Amount.	Quantity.	Amount.	Quantity.	Amount.
Ties...tons	35	$8,000	52	$12,000	44	$10,000
Shingles...do	250	5,000	500	12,500	250	8,750
Matchwood...do	448	1,000	336	900	112	400
Wool...do	10	4,000	12	5,000	12	6,000
Hides...do	40	1,400	40	1,400	40	1,400
Butter...do	40	20,000	50	25,000	30	18,000
Miscellaneous...do	50	12,000	50	12,000	40	10,000

24. The underwriters insure vessels for this port from April 1 to October 1 only. It is estimated that there are about twenty-five arrivals and departures of steamers during the above season. In addition to the above about two gasoline launches call at the port weekly.

25. Before San Francisco earthquake a steamer line between San Francisco and Port Orford called on an average once monthly.

26. Wharfage is charged at the wharf as follows:

General merchandise	per ton	$1.50
Lumber	per M	.50
Shingles	do	.05
Ties	per cord	.75
Matchwood	do	.75

27. Freight rates are as follows:

Bandon to Port Orford by gasoline schooner	per ton	$3.50–$4.00
Coos Bay to Port Orford by gasoline schooner	do	4.00
San Francisco or Portland to Port Orford	do	5.00
San Francisco or Portland via Coos Bay or Bandon	do	6.50
Freight by team, Bandon to Port Orford	per hundredweight	.60

28. The bank at Port Orford has about $20,000 in deposits and transacts business to the amount of $20,000 to $30,000 monthly.

29. Curry County, in the northwest part of which Port Orford is situated, has an area of about 1,500 square miles, most of which is mountainous.

30. Its population was about 1,500 in 1890 and is estimated at 3,000 for 1912. Owing to lack of transportation facilities there has been but little development in this county. It has an ocean frontage of about 70 miles, and Port Orford is the only deep-water harbor Rogue River is suitable for small boats only on account of the bar at its entrance. There are no railroads in the county, though surveys for same have been made along the coast and from Medford Oreg., to Port Orford. Only a few wagon roads exist, and Curry County is reached by boat to Coos Bay and then by stage, or by stage from Roseburg, Oreg. Most of the freight comes by way of Coos Bay.

31. About 6,000,000,000 feet of timber, consisting of fir, white cedar, and spruce, is scattered over the county. There are no large areas of standing timber, as this territory was swept by fire, which killed a considerable portion of it. The fire-killed white cedar is used for ties and shingles. There are several sawmills in the county. Gold is mined along the beaches on the Chetco, Sixes, and Rogue Rivers. It is estimated that about $50,000 is taken out annually.

32. There are several rock quarries, the principal ones being one near Pistol River and one at Blacklock Point, about 8 miles north of Port Orford.

33. Dairying is the principal farming industry of the county and is carried on along the river bottoms.

34. Stock raising is carried on in the hills, which are green nearly all of the year.

35. Fruit raising has not been developed in this county.

36. Other villages in the county are Langlois, perhaps the largest village in the county and situated close to the north boundary and about 15 miles north of Port Orford, with a population of 200, and having 2 hotels, 2 general merchandise stores, blacksmith shop, 1 church, and 1 school; Gold Beach, the county seat, with a population of 150, has 2 hotels, 3 stores, 1 bank, and weekly newspaper; and Wedderburn, Agness, and Harbor, 3 small villages, with a population of about 100 each.

37. *Port of Port Orford.*—A special election was held October 30, 1911, for the establishment of a port at Port Orford Harbor; 490 votes were cast, of which 250 were in favor of the port and 240 against a port. In Port Orford precinct 115 votes were cast for and 4 against a port. At Langlois 115 votes were cast against the port and 30 for a port.

38. The port limits considered begin at the mouth of Euchre Creek and extend to Coos County line, comprising 321 square miles of the northern part of Curry County, the northern boundary being about 16 miles north of Port Orford Harbor and the southern boundary about 14 miles south of the harbor.

39. The principal resources of the port are lumber and dairying. It is estimated that there is about a billion and a half feet board measure of timber within the port limits, of which about 85 per cent is fir, 10 per cent Port Orford cedar, and 5 per cent spruce.

40. The majority of the timber of the port is held by a large corporation operating on Coos Bay, and it is understood that their timber

will be hauled to that place, where they operate a large sawmill. The bulk of the timber is situated at quite a distance from the port and will involve a considerable haul, and it is uncertain how much of the timber would reach Port Orford. Most of the dairy interests are on the coastal plane north of the port and might find an easier outlet.

41. A port commission of five members was appointed by the governor of the State of Oregon, both communities favorable and those opposed to the creation of the port being represented thereon.

42. The strongest opposition to the port came from the Langlois district, which is about as far (16 miles) from Port Orford as from Bandon, where it does most of its trading.

43. The validity of the port has been attacked by the Langlois contingent on the grounds of the port being an open roadstead, having no watershed, and having no navigable waterway entering same, and a claim that illegal voting was resorted to by the majority.

44. The port commission levied a tax of 1 mill on the assessable property in the district ($1,718,000) to carry on its work, but was restrained by injunction proceedings before the collection was all made. It appears that the matter of the legality of the port will not be decided until the April, 1913, term of court.

45. The following communication from the port of Port Orford is quoted in full as necessary for a complete understanding of the conditions. The date of the communication, October 19, is copied from the original, but is obviously an error, it having been received at this office October 16, 1912.

PORT ORFORD, OREG., *October 19, 1912.*

DEAR SIR: In compliance with request of Mr. Frank C. Schubert, your assistant, who was sent to Port Orford in connection with contemplated improvements of the harbor, that we furnish you with a statement as to what the port commissioners wished in the way of improvement and what they were willing to do in shape of cooperation with the United States Government in the improvement of the harbor, beg leave to inform you that at a special meeting of the commissioners held for that purpose at which a majority of the commissioners, consisting of the president, secretary, and treasurer, were present, the following proposals were sanctioned by those present:

What we desire is the construction of a solid masonry sea wall from Graveyard Point extending for about two to three hundred feet in a southeasterly direction from said point, in order to protect our present shipping facilities from the storms of the winter, and which will also serve as a small harbor of refuge for coastwise boats or steamers in severe weather. The commissioners under the power given them in the port bill have authority to issue bonds not to exceed 10 per cent of the assessed valuation of property in the district, and by virtue of this power and authority so vested in them they feel justified in stating that they would be willing to bond the district to the extent of 2½ per cent of the assessed valuation of the property in the district, which would amount to at least one-fourth of the amount necessary to construct the above-mentioned sea wall. The present commissioners can only speak for themselves, but feel confident that any new members of the commission who may be elected at the coming November election to fill vacancies of retiring commissioners will also approve of the above proposal to bond the district, providing the result of the quo warranto proceedings at present pending is favorable.

We feel certain a free right of way for a railroad to Blacklock Point quarry could be obtained. There is an unlimited quantity of rock at Blacklock Point suitable for such work as will be necessary in the improvement of the harbor, and it will quarry in large bodies.

Under separate cover we are sending you sample of same.

Very truly, yours,

E. J. LONEY, *Secretary.*

Maj. J. J. MORROW,
Corps of Engineers.

P. S.—We are delayed in holding our meeting to take action on account of several members of the commission not attending. We decided to wait no longer, so therefore with the majority present we took action.

46. It is understood that the commissioners who did not atten the meeting referred to in the above communication are not in accor with the ideas of the majority expressed therein.

47. The assessed valuation property in the district referred to i the above communication is $1,718,000. Two and one-half per cen of this amount is $42,950. With this information it may be inferre from their communication that the port commissioners estimat the cost of the improvement requested at from $150,000 to $200,00

48. It is not believed that the present port commission is now i position to guarantee the bond issue they propose and that th coming election mentioned in the communication may result in commission the majority of which will not favor such a measure.

49. The protection that would be afforded by a breakwater o any type constructed from Graveyard Point and extending 200 t 300 feet in an easterly or southeasterly direction would add bu from 2 to 4 acres to the protected area already afforded by nature The protection thus afforded would not be complete from southerl storms and it is doubtful if it would serve to increase the presen shipping season. It is true that such a breakwater would shelter small area under its lee, and by so doing would afford some cove to the vicinity of the existing wharf, and by future suitable extensio to a length of about 1,500 feet would furnish a safe anchorage o about 25 acres outside of the 3-fathom line throughout the entir year for such vessels as might find themselves under its lee befor southerly gales made entrance dangerous. Such a port could not however, on account of its limited area, small depth, and difficul entrance during stormy weather, be considered as a harbor of refuge The value to navigation of the protection that would be afforded b the short length of breakwater now proposed by local interests or b same in connection with any possible future extension thereof woul not be at all commensurate under the present or prospective conditions of commerce with the large cost of furnishing such protection

50. *Water power, terminal facilities, etc.*—There is no water powe in the vicinity that can be coordinated with a harbor improvemen at this point.

51. There are no public wharves at this place. The existing wharf is a small structure built more than 20 years ago, and is hel by private interests. It is only suitable for moderate sized steamers. There are no mechanical appliances for handling freight at this wharf. The water front is held by private ownership and there is no public space available for wharves. One or two streets extend to the water front, but they have not been dedicated to the public.

52. *Conclusion.*—It is believed that the protection that would be afforded by improvement of the extent proposed by local interests, i. e., a breakwater two or three hundred feet long, no matter where located, at Port Orford Harbor would be inadequate, and that its value to navigation would not justify the cost of procuring same, even were cooperation on the part of the local interests assured to the extent proposed by the port of Port Orford. Further, the value of the commerce that would be benefited by it, both present and prospective, is too small as compared with cost of procuring such protection to warrant any expenditure at the present time by the General Government toward improvement that would provide adequate protection for Port Orford Harbor.

53. I am, therefore, of the opinion that Port Orford Harbor, Oreg., is not worthy of improvement by the General Government at the present time.

Henry H. Robert,
Captain, Corps of Engineers.

[First indorsement.]

United States Engineer Office,
Northern Pacific Division,
San Francisco, Cal., November 14, 1912.

To the Chief of Engineers, United States Army, concurring in the views of the district officer.

Thos. H. Rees,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors see p. 3.]

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use Doc. No. 1352 ; 62d Cong., 3d Sess.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1353.

OLD BED OF TCHULA LAKE, MISS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF OLD BED OF TCHULA LAKE, MISS., FROM MARKSVILLE TO THE MOUTH OF ABIACRE CREEK.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 5, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Maj. J. A. Woodruff, Corps of Engineers, dated November 23, 1912, on preliminary examination of old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 4, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek

1. There is submitted herewith, for transmission to Congress, report dated November 23, 1912, by Maj. J. A. Woodruff, Corps of Engineers, on preliminary examination of old bed of Tchula Lake, Miss., from

Marksville to the mouth of Abiacre Creek, called for by the river and harbor act approved July 25, 1912.

2. No previous examination of the old bed of Tchula Lake has been made by the War Department, and no work of improvement has been done by the United States in the interests of navigation. It was formed by a cut-off made about 1848, and is about 3 miles long. There is ample depth for any boat that plies on Yazoo River whenever the boats can get through the opening into Tchula Lake from that river, which requires a stage of about 15 feet at Greenwood on the Yazoo River. There is no navigation on the lake except by small gasoline boats, and the district officer states that the only commerce which is likely to develop is the boating of farm supplies. Believing that the proposed improvement would be of practically no benefit to general navigation and of but slight benefit to the small local interests, he expresses the opinion that the locality is not worthy of improvement by the General Government. In this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith of December 23, 1912, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

The Chief of Engineers, United States Army:

1. This is a report of preliminary examination of old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek. This section of the lake was made about 1848 as a result of a cut-off. The district officer states that there is ample depth for any boat that plies on Yazoo River whenever the boats can get through the opening into Tchula Lake. This requires a stage of about 15 feet at Greenwood, on the Yazoo River. There is no navigation on the lake except by small gasoline pleasure boats. The improvement of the lake would afford but little navigation, and this would be of but slight benefit to the small local interests involved. The district officer reports the locality as unworthy of improvement, in which view the division engineer concurs.

2. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their

views to the board, but no communications on this subject have been received.

3. Owing to the small amount of commerce, present and prospective, that would be affected by the improvement of the old bed of Tchula Lake, the local character of the improvement, and the probable high cost when compared with resulting benefits, the board concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the General Government to undertake this improvement.

4. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF OLD BED OF TCHULA LAKE, MISS.

United States Engineer Office,
Vicksburg, Miss., November 23, 1912.

From: Maj. J. A. Woodruff, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of old bed of Tchula Lake, Miss.

1. The following report is submitted on a preliminary examination of the old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek, required by section 2 of the river and harbor act of July 25, 1912, and assigned to me by letter from the office of the Chief of Engineers, dated August 3, 1912.

2. No previous reports of examinations of this lake are on record, and no work has been done by the United States to improve the navigation.

3. The preliminary examination was made by me in a gasoline skiff on August 16, 1912, accompanied by Asst. Engineer H. M. Marshall.

4. The old bed of Tchula Lake was formed by a cut-off made about 1848, and is similar in all natural features to the other part of Tchula Lake which is under improvement by the United States. (See Report Chief of Engineers, 1911, p. 642.) It is about 3 miles long, from 75 to 100 feet wide at low water, and 350 to 400 feet wide between top banks, which are 35 to 40 feet high. The banks are overgrown with timber down to low water. Trees extend over the water and prevent the passage of any except small boats. There is ample depth for any boat that plies on Yazoo River, say, 6 feet or more, whenever the boats can get through the opening into Tchula Lake from that river. This requires a stage of about 15 feet at Greenwood on the Yazoo River. The river is usually above that stage from January to June, during which time supplies are received but little or no shipments are made by the farmers.

5. There is no fall in the surface of the water at any stage from Abiacre Creek to Marksville, for the old bed is a lake.

6. There is a wooden trestle highway bridge across the lake about 2 miles above Marksville, which would have to be replaced by a drawbridge to permit navigation of the lake.

7. The town of Cruger, with 300 inhabitants, is on the bank of the lake about half a mile below the mouth of Abiacre Creek. Cruger is a station on the Yazoo & Mississippi Valley Railroad. The land is cleared and cultivated on both sides of the lake nearly the entire length and there is a fairly good dirt road along both banks.

8. There is no navigation in this lake except small gasoline pleasure boats. There are no terminal facilities and none are required. No water power can be developed; and there are no other subjects that may be properly connected with the improvement for navigation.

9. The only commerce which is likely to develop is the boating of farm supplies in the winter when the roads are practically impassable for hauling. The railroad receipts for freight at Cruger in 1908 amounted to slightly over $25,000, but the rates are the same as from the town of Tchula, which is on the improved part of Tchula Lake.

10. The improvement of this lake would be of practically no benefit to general navigation and of but slight benefit to the small local interests. I am therefore of the opinion that the old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek, is not worthy of improvement by the General Government.

11. There are submitted herewith a map and two photographs[1] of the lake.

J. A. WOODRUFF.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., November 26, 1912.

To Chief of Engineers, concurring in the opinion of the district officer, as stated in paragraph 10, that the old bed of Tchula Lake, Miss., from Marksville to the mouth of Abiacre Creek, is not worthy of improvement by the General Government at this time.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

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[1] Not printed.

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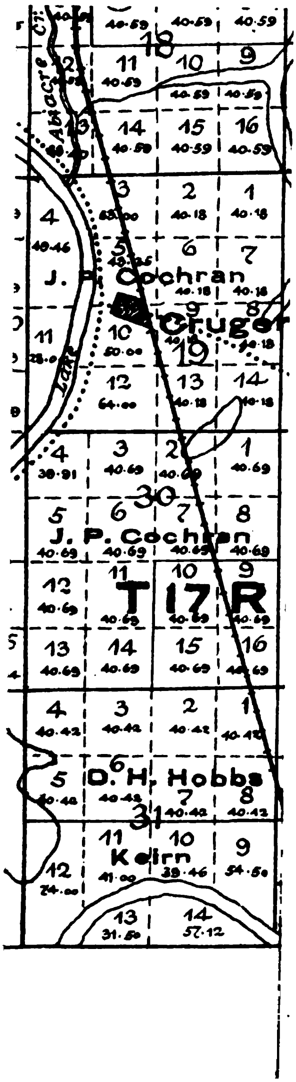
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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1354.

DARIEN HARBOR, GA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION OF DARIEN HARBOR, GA., WITH A VIEW TO SECURING BEST CHANNEL TO THE SEA.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 4, 1913.

The Speaker of the House of Representatives.

Sir: I have honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copy of a report from Col. Dan C. Kingman, Corps of Engineers, dated October 12, 1912, on preliminary examination of Darien Harbor, Ga., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 3, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Darien Harbor, Ga.

1. There is submitted herewith for transmission to Congress report dated October 12, 1912, by Col. Dan C. Kingman, Corps of Engineers, on preliminary examination of Darien Harbor, Ga., with a view to securing the best channel to the sea, called for by the river and harbor act approved July 25, 1912.

2. There are four possible routes from Darien to the sea. The old route was via Darien River and Doboy Sound, in which the channel is so shallow, shifting, and uncertain that it can not be improved or maintained at reasonable cost. Another route is via the Altamaha River and Sound, which is a little shorter than the Doboy route, but the ruling depth on the bar is not much greater than in the first route, and its interior channel would probably be more difficult to maintain A third route is via Teakettle, Mud River, and Sapelo Sound. A fourth route is via Old Teakettle, Creighton Narrows, and Front River and Sapelo Sound, already more used than the third, and in the opinion of the district officer the best channel to the sea. The district officer reports that it would not be very difficult to secure a depth of 12 feet at low water from Darien to deep water in Sapelo Sound, but such a channel would be utilized only by small schooners, the number of which is constantly diminishing; and as the timber and lumber can already be taken to Front River on the depth which the authorized inland waterway will afford, he expresses the opinion that this route is not worthy of further improvement at the present time.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith of December 23, 1912, concurring with the district officer, who is also division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress I report that the improvement by the United States of Darien Harbor, Ga., with a view to securing the best channel to the sea in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

The Chief of Engineers, United States Army:

1. This examination of Darien Harbor, Ga., is called for with a view to securing the best channel to the sea. There are three routes considered from Darien to the sea: (*a*) Via Darien River and Doboy Sound; (*b*) via Altamaha River and Sound, a little shorter than the Doboy route, with about the same depth, but probably more difficult of maintenance in the interior channel; (*c*) via Old Teakettle, Creighton Narrows, Front River, and Sapelo Sound. Front River and Sapelo Sound are now used by steamers of considerable size, as there is a natural depth of about 17 feet on Sapelo Bar, and a large part of the commerce of Darien, which consists almost wholly of lumber, is now delivered to steamers in Front River. Creighton Narrows is to be improved as a part of the 7-foot inland waterway, Savan-

nah to Fernandina, and the facilities will then be better than along the present route by way of Mud River. The shipments of lumber in 1911 amounted to about 25,000 tons by Doboy Sound, 38,000 by Sapelo Sound, and 47,000 by inland waterways to Savannah and Brunswick.

2. The district officer, who is also division engineer, is of opinion that the best route from Darien to the sea is via Darien River, Old Teakettle, Creighton Narrows, Front River, and Sapelo Sound, but that this route is not worthy of improvement beyond that already contemplated in connection with the inland waterway.

3. Interested parties were notified of the tenor of the district officer's report, and given an opportunity of presenting their views to the board. A communication from Hon. Charles G. Edwards, inclosing one signed by a number of interested persons, has been received and given consideration, and on December 9, 1912, a hearing was given in the office of the board, at which appeared Hon. Hoke Smith, United States Senator; Hon. Charles G. Edwards, Member of Congress; a delegation from the locality, and Col. Kingman, district officer.

4. It appears from the information received that the Doboy route was formerly used in preference to any other for the shipment of lumber from Darien; that it is more economical, as the lumber can be floated to the vessel at Doboy, whereas it must be towed to reach Front River and Sapelo Sound; and that the people now interested prefer the Doboy route and desire the improvement of the outer bar, which it is claimed has shoaled and which is the obstacle to economical shipments.

5. The existing project for the improvement of Doboy Bar, adopted March 3, 1899, provides for a channel 300 feet wide and 24 feet deep at mean high water. As the mean tidal fluctuation is about 7 feet, the project depth at mean low water is about 17 feet. Under this project about $49,000 was expended. It is stated in the report of the Chief of Engineers for 1912 that "practically no advancement has been made toward the completion of the project, and it is quite doubtful if the desired improvement at this bar can be effected by dredging alone, except at great cost. None of the natural or artificial channels across the bar appear to have any stability." It is also stated that "no additional work is proposed and no appropriation is recommended. Pending authorization by Congress of further work at this locality, this project will be omitted from future annual reports."

6. It appears that there is a shifting natural depth over this bar of about 10 to 11 feet, and that the dredged channel, which was given a depth of 12 feet, has not maintained this depth; that a channel some distance south has now a better depth, and it is desired by those in interest that this channel be improved to afford a depth of 12 feet. It was claimed at the hearing that the dredged channel was not located in the thread of the natural current, and that if a small amount of work were done in the present natural channel, it would be reasonably permanent and the cost of maintenance would be small. The board is not in accord with this view. The history of this bar indicates that the natural depth has been about 10 feet to 11 feet, that the channel has been more or less shifting in character, and

that unless confined between jetties, any shallow channel would fill and shift with the storms and tides.

7. In addition to the natural outlet over Doboy, 10 feet to 11 feet in depth, the completion of the 7-foot inland waterway will give a good barge and rafting depth to deep water at Sapelo. The board believes that either of these routes can be advantageously used, depending on draft of vessel to be loaded, the latter permitting boats of 20 to 22 feet draft to be chartered, and the former boats of 15 to 17 feet draft, advantage being taken of the tide in both cases. Considering all the circumstances and the evident large cost of any improvement of the ocean bar at Doboy, the board believes that these outlets furnish all the facilities economically justifiable, and therefore it concurs with the district officer, and reports that it is not advisable for the United States to undertake any further improvement at this locality.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF DARIEN HARBOR, GA.

War Department,
United States Engineer Office,
Savannah, Ga., October 12, 1912.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Darien Harbor, Ga.

1. The river and harbor act of July 25, 1912, called for an examination or survey of Darien Harbor, Ga., with a view to securing the best channel to the sea. A preliminary examination has been made under my direction by Assistant Engineer W. C. Lemen, and his report is transmitted herewith.

2. The history of the harbor of Darien is not unlike that of many of the small harbors of the United States. The term "harbor" was originally applied to a place of safety or shelter. A maritime harbor was a place of safety and shelter for ships. A commercial harbor is one which not only possesses the qualities of safety and shelter but which affords facilities for receiving and shipping cargoes. Since no place can consume or produce the cargoes of a great many ships, it follows that the articles received must be distributed over a considerable extent of country, and this same country must be drawn upon to secure articles for shipment. Therefore, a harbor is a place where the mode of transportation is changed from land to water, or the reverse.

3. Darien is situated on one of the branches of the delta of the Altamaha River. It was placed upon the high ground nearest the sea. No town could well have been located upon this river system nearer the ocean than Darien. The articles brought down the river naturally stopped here, and were transferred to vessels that could navigate the sea. In the early days the vessels were not large, the cargoes were not large, and Darien answered the purposes of a harbor

upon this river system. The depth of water which could be carried up to the town hardly equaled 12 feet at low tide. When a larger class of vessels began to be used, shipments were made from Doboy Island and other points nearer the sea, and now almost everything that is brought down the Altamaha River for shipment is carried either to Brunswick on the south or to Front River or to Savannah on the north. There is no likelihood of this condition ever being changed. The large ports draw the vessels and the numerous vessels attract the freight. A small place like Darien could not furnish quickly the freight for a single large ship, even if a large ship could reach its wharves. It would be better to consider this simply as a landing place on the Altamaha River and look for a harbor elsewhere—look for it at some point reached via the inside water route.

4. The law requires, however, that the best route from Darien to the sea shall be indicated. Mr. Lemen's report gives a sketch map of the waterways in the vicinity of Darien. There are three possible routes. The old route was via Darien River and Doboy Sound. The channel in this sound is so shallow, so shifting, and so uncertain that it can not be improved or maintained at reasonable cost. Another route is via the Altamaha River and Sound. This is a little shorter than the Doboy route, but the ruling depth on the bar is not much greater in one case than in the other, and I think there would be more difficulty in maintaining the interior channel in this case than in the other. A third route is via Old Teakettle, Creighton Narrows, Front River, and Sapelo Sound. The route through Front River, via Sapelo Sound, is now used by steamers of considerable size, and most of the commodities shipped from Darien are now taken to Front River and there delivered to steamers, the articles for shipment being entirely lumber in one form or another.

5. The improvement of Creighton Narrows, which is now authorized, will make this route shorter and better than it is via Mud River. It would not be very difficult by dredging to secure a depth of 12 feet at low water from Darien to deep water in Sapelo Sound, which would give it as much water as it ever had, but I do not think this would serve any useful purpose. Ocean vessels would not even then go up to Darien to receive cargoes. Nothing would go there but small schooners, and the number of these is constantly diminishing. The timber and lumber can be taken to Front River perfectly well with the depth which the inside route will afford, and this, in my opinion, is all that is necessary.

6. In answer to the question of Congress, therefore, I would say that the best route from Darien to the sea is via the Darien River, Old Teakettle, Creighton Narrows, Front River, and Sapelo Sound, but that this route is not worthy of improvement beyond the point that it will be improved by the development of the inside water route. I do not think that any survey is necessary.

7. As this report is unfavorable, notice has been sent to all persons known to be interested, a list of whose names, together with a copy of the notice sent, is inclosed herewith.[1]

DAN C. KINGMAN.

[For report of Board of Engineers for Rivers and Harbors, see page 2.]

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[1] Not printed.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., October 7, 1912.

From: W. C. Lemen, Assistant Engineer.
To: Col. Dan C. Kingman, Corps of Engineers.
Subject: Preliminary examination, Darien Harbor, Ga.

1. There is submitted the following report upon the preliminary examination of Darien Harbor, Ga., with a view to securing the best channel to the sea, in accordance with the river and harbor act as passed by the last Congress and approved July 25, 1912.

2. The wording of the above request has led to the consideration of all possible routes from the port of Darien to deep water other than that which has been heretofore considered as Darien Harbor proper, and there is submitted herewith a sketch map showing three possible alternate routes for the benefit of this harbor.

3. Before taking up a description or discussion of these three routes a general location of Darien Harbor, with a history of its improvements, will be given, as set forth in the preliminary report upon this harbor and Doboy Bar made under date of July 26, 1911, from this office by Asst. Engineer E. R. Conant:

"*Location.*—The delta of the Altamaha River has several branches. The north branch is known as Darien River, and that portion of Darien River between the town of Darien and Doboy Sound constitutes Darien Harbor. Darien River enters Doboy Sound, and the ocean entrance to this sound is over Doboy Bar. The harbor of Darien is situated in the collection district of Brunswick, Darien being a subport of entry. Sapelo lighthouse is located at the entrance to Doboy Sound. Forts Screven, Pulaski, and Clinch are the nearest forts.

"Doboy Bar lies about midway between the entrance to the Savannah River and the mouth of the St. Johns River. It is 18 miles north of the entrance to Brunswick Harbor. The bar proper is 3 miles from the entrance to Doboy Sound and is 18 miles from Darien.

"*Physical characteristics.*—Doboy Bar is a shifting fan-shaped shoal extending from Sapelo Island on the north to Wolf Island on the south. The width of the crest of the bar is 2.5 miles. The material forming this bar is mainly a mixture of fine sand with broken shells more or less compacted due to constant wave action. The bar is essentially a drift wave bar composed of material readily acted upon by wave action, and the incipient channels leading from the deep basin inside to the deep sea beyond the bar are in the transition stage; and there has never been a readily navigable ship channel across the bar which could be considered to have any permanency as to location. There are two channels across the bar which have maintained about the same general depth.

"The mean rise and fall of tide on the bar is about 7 feet, at the mouth of Darien River 7 feet, and at Darien 6.5 feet.

"*Original condition.*—In 1868 the controlling depth in the ship channel on Doboy Bar was 14 feet at mean low water. At about this time decided shoaling took place, and the controlling depth was reduced to about 11 feet. Since 1886 the controlling depth in the south ship channel has varied from 10 to 12 feet and the depth in the north channel has varied from 8 to 11 feet.

"Darien Harbor in its original condition was obstructed at seven points by shoals with a mean low water depth on same varying from 6.5 to 10.5 feet.

"*Projects of improvement—Doboy Bar.*—A special allotment of $10,000 for Doboy Bar was made by Congress in 1886 from the appropriation for the improvement of the Altamaha River, and about half of this allotment was spent in harrowing and water-jetting the crest of the bar. A project for the improvement of the bar was adopted by Congress March 3, 1899. This project provided for creating a channel by dredging 24 feet deep at mean high water with a width of 300 feet, at an estimated cost of $70,000.

"*Darien Harbor.*—There was expended on this harbor in 1879 for dredging $8,000 without any project having been recommended or adopted. The project for the improvement of this harbor authorized in 1885 provided for the establishment of a navigable channel 12 feet deep at mean low water between Darien and Doboy Bar at an estimated cost of $170,000.

"*Improvement accomplished—Doboy Bar.*—The expenditure of $5,795.40 allotted in 1886 accomplished practically nothing toward obtaining the desired increase in depth. Work under the project authorized in 1899 commenced on April 9, 1900, and between that date and December 16, 1900, 119,896.3 cubic yards was removed. This work, beyond increasing the depth inside the crest of the bar, only increased the controlling depth about 1.5 feet. Work was carried on by contract, but no work was done after December 16, 1900, and the contract was annulled.

In 1901 a survey of the improvement made in 1900 showed that that portion of the channel which was deepened had filled and all the work done was lost. Following the survey made in 1901 the work was readvertised, but no bids were received. In 1904 the improvement was again taken up and the work advertised. The lowest bid received was 34 cents per cubic yard, which was rejected, with recommendation that the work be done with Government dredge, which work commenced om November 4, 1905, and ended on May 31, 1906, with the removal of 130,953 cubic yards. This accomplished a channel 150 feet wide with a controlling depth of 12 feet at mean low water, the location of which was about 1,000 feet south of the position of the first improvement.

"*Improvement accomplished—Darien Harbor.*—The project adopted in 1885 was accomplished, a navigable channel 12 feet deep at mean low water being obtained."

4. The above report sets out very clearly the condition of one of the above-mentioned routes from the port of Darien to deep water as it exists to-day. The other two alternate routes will be taken up and described in their geographical order from north to south.

5. The northern route will make use of a portion of the present route, namely, Darien River from the city of Darien to Doboy Sound, thence across this sound and by way of New Teakettle and Old Teakettle Rivers, South Sapelo River, Creighton Narrows, Front River, Sapelo Sound, and out over Sapelo Bar. From the vicinity of Doboy Sound it follows the inside water route as adopted by the recent Congress. The portion of inside waterway in the vicinity of Creighton Narrows is under improvement to a depth of 7 feet at mean low water with a bottom width of 100 feet. This improvement will also include a part of the shoal portion of Front River. There occurs at other points on this route, namely, at Sapelo Dividings, in the vicinity of mileage 17 (as shown on the accompanying maps) and in the vicinity of mileage 15, two other shoals with a controlling depth less than what might be considered the necessary depth to be obtained for the use of Darien Harbor. The total length of shoals necessary to be removed to obtain 12 feet at mean low water (the present project depth in Darien River), is 16,600 feet.

6. While the amount of improvement necessary on this route to obtain an equal depth to that practically existing in Darien Harbor is considerable, yet by the improvement of this route there is a further advantage of facilitating the handling of timber from the Altamaha River system to the docks existing at Front River. At this point sufficient depth exists to enable the loading of steamships drawing 23 feet. It also has the further advantage of being a link in the inside waterway for which there has been considered an improvement of 12 feet at mean low water. While the length of tow over this route is considerably more than that over the other two routes to be considered, yet it is not excessive in consideration of the limited commerce and the class of same that is likely to use it as compared to the use that is made of the lower portions of the Satilla and St. Marys Rivers, where tows from loading docks to the sea are as high as 40 to 45 miles. There exists this difficulty over this route, however, that is not met on the above tows, that the direction of the flow of the tides will be such as to probably necessitate the using of two complete tides in order to reach the sea with a loaded vessel.

TIDES.

7. The rise and fall of the tide over this route varies from 6.5 feet at Darien to 7.5 feet in the vicinity of Sapelo Sound and 7 on Sapelo Bar.

8. The third alternate route, namely, out over Altamaha Sound, is the shortest of the three under consideration; this route starting from Darien would follow Darien River for only about 2 miles, thence by means of a cut through the marsh, not any more extensive or expensive than that through Creighton Narrows, the main Altamaha River can be reached. Following down this stream, the inside waterway is joined at the mouth of One-Mile Cut, and this route followed as far as the lower part of Altamaha Sound, and is shown on the map to reach the ocean in two possible routes, information being at hand that marked shoaling has occurred on the route to the south of Egg Island, and that probably the channel has broken out along to the north of Egg Island next to the shore of Wolf Island.

9. From an examination of the general character of Altamaha Bar as shown on the old Coast Survey maps, it would appear that the flow over this bar is much more concentrated than that over Doboy Bar, and if such should be borne out by a later examination, it is probable that the maintenance of a channel over this bar would be much more permanent than over Doboy Bar.

10. From surveys made at various times during the last five years, sufficient information is at hand to make a very close estimate of the actual cost of any improvement to a depth of 12 feet at mean low water for either the route over Doboy Bar or that out over Sapelo Bar, but before any determination could be made of the cost over the third route over Altamaha Bar, a complete survey of this locality would be necessary.

11. The rise and fall of tide varies from 6.5 at Darien, 7 in Altamaha Sound, and about 6.5 on Altamaha Bar.

12. In consideration of the oft-repeated failures to attain any satisfactory improvement of this channel by way of Darien River and Doboy Bar by means of dredging, and in consideration of the length of the tow and the tidal conditions existing upon the route from Darien proper by way of Sapelo Bar, it might be advantageous to investigate more thoroughly the conditions that exist over the third route, provided there actually existed an adequate amount of commerce from this port which would justify the attempt of an improvement.

COMMERCE.

13. The Altamaha River and its tributaries, the Oconee and Ocmulgee, drain what has been (and is yet to a great extent) a heavily timbered region, and large quantities of timber have sought for years, and will continue to seek to a less extent for some years to come, an outlet to the ocean at the mouth of this river. The commerce of Darien consists almost entirely of timber and lumber, and some finished products from this raw material. For many years this timber was rafted to Doboy Sound and then shipped in vessels of small tonnage over Doboy Bar. A few larger draft vessels have been loaded at Darien. The later development of shipping in deeper draft vessels more adapted to foreign trade has made it impracticable to use this port for other than small sailing vessels.

14. The commerce handled at the port of Darien during the calendar year 1911, as reported in the Chief of Engineers' Report for the fiscal year ending June 30, 1912, is as follows:

Over Doboy Bar, 12,600,000 feet b. m. lumber, valued at $208,400, shipped coastwise.

Towed to Sapelo Harbor in rafts, and then shipped for export trade, 19,062,000 feet b. m., valued at $289,228.

Timber towed in rafts from Darien to Brunswick and Savannah for shipment, 23,480,000 feet b. m., valued at $313,200.

15. The local freight handled at this port, over a portion of the inside waterway between Brunswick and Darien amounted to 2,050 tons, valued at $355,622. It will be noted from the above that the amount towed to Sapelo (which is over the alternate route, by way of Sapelo Bar) is 50 per cent greater than that handled over the route by way of Doboy Bar, and the shipments by rafts to Brunswick and Savannah (the major portion of which is to Brunswick) is 100 per cent greater than that shipped over the route by way of Doboy Bar. The Sapelo shipments would be materially benefited by the adoption of the Sapelo Bar Route, and the Brunswick shipments by the adoption of the third alternate route over Altamaha Sound.

16. In general the above class of shipments may be expected to slowly decrease in amounts, owing to the depletion of the pine timber of this belt of country, and the only hope of an increase in amount is that some marked use can be made of the vast amount of hardwood existing adjacent to the Altamaha River system.

TERMINAL FACILITIES.

17. No wharves are owned by the public at the port of Darien, but such terminal facilities as exist are extended to all on equal terms. The existing wharves are held by individuals, but there is reported to be public space for the construction of new ones, should the necessity arise.

18. Transshipment of freight between rail and water exists, and traffic arrangements can be made on equal terms to all with the railroad terminating at this port.

RÉSUMÉ AND RECOMMENDATIONS.

19. Of the three alternate routes from the port of Darien to deep water, their advantages and disadvantages may be summed up as follows:

20. Sapelo Bar Route, 30 miles in length, is over a portion of the inside waterway, which it is desirable to further develop along the same route necessary for the accommodation of the traffic of this port, and thus combine the commerce of the port of Darien with that shipped from the docks in Front River, but it is subject to the difficulties of tidal conditions.

21. The Doboy Bar route is next in length, being practically 21 miles in length from dock to sea, has been the subject of attempts at improvement for a number of years, the project depth of Darien Harbor having been attained over this bar for a short period by means of dredging, but owing to the constant shifting of the channel of this bar no reliance can be laid on any improvement by means of dredging.

22. The third alternate route by Altamaha Sound is an unknown quantity, with very attractive features in some respects, due to the fact that it is the shortest, and the bar at the entrance is probably capable of more permanent improvement than that over Doboy, but can not be compared to the depth of water found over Sapelo Bar, which is ample, and yet this route will present an improved condition for the transportation of such raw material as now seeks an outlet through the port of Brunswick.

23. As stated above, owing to recent surveys, ample data is at hand for preliminary estimates for the cost of improvements over the two first-named routes, but an extensive survey would be required to determine conditions over the third route, and in consideration of the very limited amount of commerce of this portion, it is not deemed worthy of a recommendation for further study or development excepting that it be combined with the improvement of the portions of the inside route by way of Creighton Narrows, Sapelo Bar, or by way of Altamaha River and Altamaha Bar.

24. In connection with this report, some four weeks ago, letters were addressed to parties who were supposed to be interested in this matter and have holdings at the port of Darien. Up to this date, no reply has been received to these requests, which would indicate very little interest in the improvement, and in consideration of this lack of interest, and the small amount of commerce affected, it is recommended that no further improvement be considered.

W. C. Lemen.

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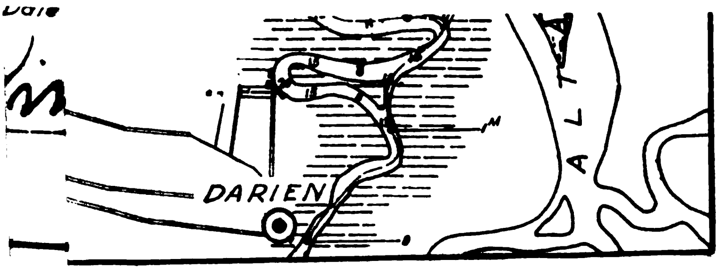

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62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1355.

HUGHES RIVER, W. VA

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF HUGHES RIVER, W. VA.

FEBRUARY 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 4, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copy of a report from Maj. F. W. Altstaetter, Corps of Engineers, dated November 19, 1912, with map, on preliminary examination of Hughes River, W. Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 3, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Hughes River, W. Va.

1. There is submitted herewith, for transmission to Congress, report, with map, dated November 19, 1912, by Maj. F. W. Altstaetter, Corps of Engineers, on preliminary examination of Hughes River, W. Va., called for by the river and harbor act approved July 25, 1912.

2. The Hughes River is formed by the junction of the north and south forks of the Hughes River at Cisko, and flows about 13 miles

before it empties into the Little Kanawha River, 15 miles above its mouth, at Parkersburg. The Hughes River lies in the drainage area of the Ohio River.

3. The Hughes River has a small commerce, estimated at 9,000 tons of timber and not over 1,000 tons of general supplies. The improvement apparently desired is a 5 or 6 foot depth extending throughout the main river, and about 10 miles up the south fork to Macfarlan, a total distance of 23 miles. The physical characteristics are such as to render impracticable the attainment of a suitable depth by open-channel methods, and in the opinion of the district officer the situation does not justify the expenditure required for locks and dams. The division engineer concurs in believing that it is not advisable for the General Government to undertake the improvement of this river.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report, dated December 23, 1912, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Hughes River, W. Va., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

The Chief of Engineers, United States Army:

1. Hughes River, formed by the junction of the north and south forks, is a small tributary of the Little Kanawha River about 13 miles in length. No work has been done in this river by the General Government. The tributary country is rugged, rather sparsely settled, and the valley is quite narrow. The fall from Macfarlan, the head of desired improvement, is about 42 feet, distributed over a distance of 18½ miles, an average of 2.3 feet. The discharge of the river at probable low water is given as 6 cubic feet per second at Macfarlan and 9 cubic feet per second about 5 miles from the mouth. The principal obstructions consist of a log boom about 3 miles above the mouth, a mill dam at Freeport, 7½ miles above the mouth, and several bridges, built or under construction.

2. There is necessarily very little commerce on the river at present, the amount being estimated at 9,000 tons of timber and not over 1,000 tons of general supplies. The estimated increase in case of improvement is 4,000 to 5,000 tons. The improvement desired is reported to be the slack-watering of the main river and of about 10 miles of the south fork, making about 23 miles in all.

3. The district officer reports that no suitable depth could be obtained by ordinary open river work, and that the situation does not merit the expenditure required for locks and dams, and therefore he does not recommend a survey. The division engineer concurs in the views of the district officer.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. In view of the small amount of commerce on and tributary to this river at the present time, the improbability of any material increase even if the river were improved, and the great cost of an effective improvement, the board concurs in the views of the district officer and the division engineer and reports that in its opinion it is not advisable for the General Government to undertake the improvement of Hughes River, W. Va.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF HUGHES RIVER, W. VA.

War Department,
United States Engineer Office,
Wheeling, W. Va., November 19, 1912.

From: Maj. F. W. Altstaetter, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Hughes River, W. Va.

1. In compliance with letter of August 3, 1912, from the department, the following report on the preliminary examination of Hughes River, W. Va., is submitted, as required by the river and harbor act approved July 25, 1912:

2. The Hughes River is formed by the junction of the north fork of the Hughes River and the south fork of the Hughes River at Cisko, and flows about 13 miles before it empties into the Little Kanawha River, 15 miles above the mouth of the latter at Parkersburg. The north fork rises in Tyler County and flows in a southerly direction, having a total length of about 35 or 40 miles. The south fork rises in Doddridge County, flows west, and is about the same length as the north fork. The entire watershed of both forks of the Hughes River varies from a mile or two wide, at its mouth, to 15 or 20 miles in width half way up to the headwaters. The drainage area is only 538 square miles. The improvement which the inhabitants of the valley apparently desire is locks and dams to provide a 5 or 6 foot depth extending throughout the main river, and about 10 miles up the south fork to Macfarlan, a total distance of 23 miles. No work has previously been done by the Government on the im-

provement of the navigation of this river, and no reports of examinations have been made. Drawing LK17/1, inclosed herewith, shows the river and the relative position to the main lines of transportation in the vicinity.

3. *Valley of the river, etc.*—There are no towns of any size on the river, or either branch, having a population of more than 300. This is the population of Macfarlan, located about 10 miles above the mouth of the south fork, and is the terminus of the Cairo & Little Kanawha Railroad which connects with the Baltimore & Ohio Railroad. The lower 12½ miles of the river lie in Wirt County and above that the principal part is in Ritchie County. These two counties had a population, at the last census, of 26,922, each one of these counties having lost a little over 1,000 in population between the census of 1900 and 1910. The total population of Hughes River Basin is probably between 15,000 and 20,000.

This territory is quite rugged, lying in the foothills of the Alleghenies. The bottom land ranges in width from a few feet to 1,000 or 2,000 feet, and in some cases is quite fertile. The principal vocation of the inhabitants is farming, lumbering, and operating oil and gas wells. It is reported that there are from 2,000 to 3,000 wells in the valley. The natural course of most of the timber is down the river, including its forks. There are no coal mines in this vicinity.

4. *Physical characteristics.*—A field reconnoissance was made of the Hughes River and the south fork from the mouth to Macfarlan. From the information at hand a map was prepared which was used in the field for obtaining additional information. The map[1] is made in three sheets, LK17/2, 3, and 4, which are inclosed herewith.

The slackwater from Dam No. 2, Little Kanawha River, extends about 4¾ miles up the Hughes River, from which there is a series of riffles and pools for about 2½ miles to Freeport (mile 7¼), where a mill dam is located. Slackwater from this mill dam extends about 2¼ miles to mile 9½, beyond which to mile 23 at Macfarlan is a series of riffles and shallow pools. These are shown more in detail on the map of the reconnoissance. The total fall of the river from Macfarlan to the pool from Dam No. 2, Little Kanawha River, is about 42 feet, extending over a distance of 18¼ miles, making an average fall of 2.3 feet per mile. The riffles vary in length from 100 feet to three-fourths of a mile, with a minimum depth of 0.2 foot of water in the channel. The discharge was roughly measured, and at Macfarlan was approximately 6 cubic feet per second, and about 5 miles from the mouth it was 9 cubic feet. The river was supposed to be near its low-water discharge at the time. The high water of the river is about 24 or 25 feet above low water at all points. As the basin of the river is small, the rises last a very short time. The river bed in general is gravel. At the riffles large gravel is found, while some of them have a solid rock bottom. The worst obstruction is at a place called "Blowed Rock," 5 miles from the mouth, where large rocks protrude above the river bed. The banks of the river are steep and the height above low water varies from 12 to 30 feet; they are composed of a very firm material containing a large amount of sand and clay with occasional rocks and boulders embedded. There are a few places where the banks are of solid rock. The distance between the banks varies from 115 to 200 feet, the average width being about 135 feet.

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[1] Not printed.

Mr. William M. Hall, assistant engineer in local charge of the Hughes River, reports as follows concerning the general navigable condition of the Hughes River:

> There are no gauges on Hughes River, and I have no gauge records of any description for that river. Mr. H. C. Howe, director for the local Weather Bureau Office, advises that his office has never had any gauge records on the river, and he has never heard of any being taken.
>
> From my general knowledge of the discharge of that stream and the proximity of its watershed to that of the Little Kanawha River, I am satisfied that on 75 to 90 per cent of the days on which there are flood stages in the Little Kanawha River, there are similar stages in Hughes River. Acting on this supposition, I have had the following table of average number of days for each month of the year on which there will probably be a boating stage in the Hughes River, from Macfarlan to the mouth, prepared. This table is prepared from the gauge readings of Dam No. 1, Little Kanawha River, from 1907 to 1911, inclusive, it being assumed that on each day when there is between 2 feet and 10 feet depth of water on the crest of Dam No. 1, there will be a boating stage in the Hughes River. The table is as follows:

Days each month, from 1907 to 1911, inclusive, on which there was between 2 feet and 10 feet depth of water on crest of Dam No. 1, Little Kanawha River.

Month.	1907	1908	1909	1910	1911	Average.
January	25	6	6	26	25	18
February	18	11	21	16	19	17
March	23	24	16	12	13	18
April	16	9	12	8	23	14
May	13	15	8	12	....	10
June	14	....	5	11	3	7
July	14	2	....	....	....	3
August	4	....	....	....	1	1
September	2	....	....	....	15	3
October	[1] 4	....	....	....	16	4
November	[1] 3	....	....	....	13	3
December	14	....	1	3	14	6
Total	150	67	69	88	142	103

[1] Averaged. Pool drawn.

> In this connection I will call attention to the fact that one of the greatest difficulties in open-river navigation on this stream is that the rises in summer and fall, and to a greater or less extent in winter, are of such short duration that boats can not be loaded at Parkersburg, reach their destination, unload, and get out of the river without great danger of being caught above the shoals by low water, and thereby detained and temporarily put out of service.

5. *Obstructions.*—About 3 miles above the mouth of the river is a log pier boom, owned and operated by the Hughes River Boom & Lumber Co. The milldam at Freeport, mile 7¼, is of timber-crib construction, 196 feet long, with a lift of 8 feet. At Macfarlan are two iron suspension footbridges across the river, one with a span of 150 feet, 25 feet above low water, and one with a span of 178 feet, 28 feet above low water. At mile 16⅛ one abutment is completed and another started, for a steel truss bridge, with a span of 120 feet and clearance above low water of 25 feet. At mile 7¼ is a steel truss bridge with a span of 158 feet and a clearance above milldam pool of 28 feet.

6. *Commerce.*—I have been informed that for many years boats have been run as far as Greencastle, 2 miles above the mouth, and occasionally as far as the milldam at Freeport. I am also informed that previous to the building of the boom in 1902 it was common

practice to run rafts from Macfarlan to the mouth, but as the m
was built about 75 years ago it must have been a serious obst
rafting timber. It is impossible to obtain definite statistics o
nage of the river, but the annual tonnage of timber is estima
9,000 tons and the other supplies at not over 1,000 tons. If th
dam were removed and a system of locks and dams built, it is t
that commerce in farm products, oil-well supplies, merchandis
would be developed to an amount estimated at 5,000 or 6,00
annually. The lumber, consisting principally of saw logs and r
ties, would probably not be materially affected. The est
increase in commerce with the foregoing improvement is th
4,000 to 5,000 tons annually. The removal of only the m
might cause a slight increase in commerce.

Should this river be improved, the largest shipments of farm
ucts would probably take place from July to December; of
and lumber, from March to December; of oil-well supplies, fro
to December; of fertilizers, during March, April, August, an
tember; of coal, from August to November; and general me
dise, throughout the year.

7. *Terminal facilities, etc.*—There are no terminal and t
facilities of any kind on the Hughes River unless the log pier bo
catching lumber should be considered such. This boom is ad
and efficient. There being very little commerce, it would
advisable to put in other facilities.

Due to the extremely low discharge, there would probably
development of water power advisable, even should the ri
improved by locks and dams. There are no other matters
which would properly be connected with the improvement
river.

8. *Recommendation.*—At the mouth of this river is the
Kanawha River, which is improved. At the other end of the
of river under discussion is a railroad, and the distance betwee
two points is only 23 miles. The territory and the commerce
would be affected by any improvement is small. No suitable
could be obtained by ordinary open-river work, and it is not b
that the situation merits the expenditure required for locks and
Reservoirs to increase the open-channel flow have not been i
gated, but any rational expenditure on them would be greate
is considered desirable, and they are not recommended. It is
mended that no survey be made and that this river be not imp

F. W. ALTSTAET

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
November 27, 1

THE CHIEF OF ENGINEERS:

I concur in the views of the district officer, and do not cons
advisable to undertake the improvement of Hughes River at thi

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engi

[For Report of the Board of Engineers for Rivers and Harbo
page 2.]

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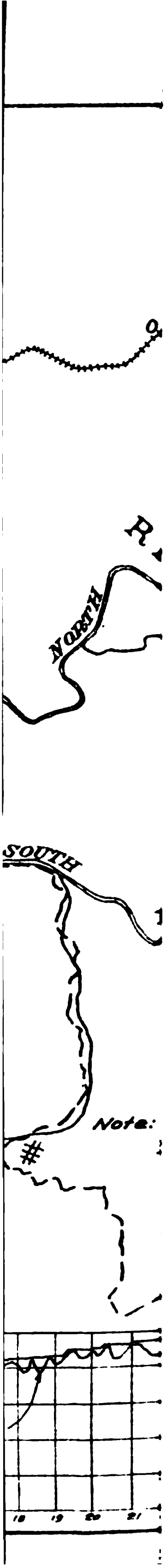
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62d Congress, } HOUSE OF REPRESENTATIVES. { Document
3d Session. } { No. 1356.

NORTHEAST CAPE FEAR RIVER, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF NORTHEAST CAPE FEAR RIVER, N. C., FROM ITS MOUTH TO HALLSVILLE.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 4, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copies of reports from Capt. L. H. Rand and Maj. H. W. Stickle, Corps of Engineers, dated November 24, 1911, and December 4, 1912, with map, on preliminary examination and survey, respectively, of Northeast Cape Fear River, N. C., from its mouth to Hallsville, made in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,
Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 3, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Northeast Cape Fear River, N. C.

1. There are submitted herewith, for transmission to Congress, reports dated November 24 1911, by Capt. L. H. Rand, Corps of Engineers, and December 4, 1912, with map, by Maj. H. W. Stickle,

Corps of Engineers, on preliminary examination and survey, respectively, of Northeast Cape Fear River, N. C., from its mouth to Hallsville, called for by the river and harbor act approved February 27, 1911.

2. Northeast Cape Fear River lies in the drainage area of the Cape Fear River and rises in the northeast part of Duplin County and flows in a general southerly direction a distance of 130 miles, emptying into the Cape Fear River at Wilmington. The projected depth is not in excess of the depth obtained in Cape Fear River.

3. The existing project for its improvement provides for clearing the natural channel for small steamers to Hallsville, 88 miles above Wilmington, and for pole boats to Kornegays Bridge, a further distance of 15 miles. It appears that there is no urgent demand for greater navigation facilities throughout the stream, and the district officer is of opinion that no enlargement of this project would be justified by the benefits to be expected. The lower part of the river for a distance of about 1¼ miles is included in the present project for improvement of Cape Fear River at and below Wilmington, which provides for a depth of 26 feet. Considerable interest has been manifested in securing an extension of deep water for a further distance of about 1½ miles. On this stretch are located several important fertilizer factories, having a combined commerce estimated at 113,700 tons, valued at $1,311,800, for the calendar year 1912. Of the above, about 34,000 tons of phosphate rock now comes by rail, but the district officer states that a depth of 20 or 22 feet to these factories would enable them to receive this rock by water at a saving of about 30 cents per ton, and also enable them to save the cost of transporting about 35 per cent of other material from Wilmington to the factories by rail or lighters. The district officer submits an estimate of cost of a channel 150 feet wide and 22 feet deep, in the sum of $50,750, and an estimate for a channel of similar width and 20 feet deep, in the sum of $37,000. He expresses the opinion that the present and prospective commerce justifies the improvement by the General Government in accordance with the first plan. The division engineer believes that if the improvement is undertaken, greater channel width should be given.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 13, 1913. The board states that the three fertilizer factories now have a considerable tonnage that would be affected by a more commodious channel and that such a channel would result in a material saving in the handling of their heavier commodities. It appears that these concerns would be directly benefited, while the general public would be indirectly benefited by the work. After mature consideration the board reports that in its opinion it is advisable for the United States to undertake the construction of a channel 150 feet wide and 22 feet deep, as proposed by the district officer, provided local or other interests will contribute one-half the cost of first construction.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Northeast Cape Fear River, N. C., is deemed advisable so far as to secure an available channel depth of 22 feet and a channel width of 150 feet increased at entrances and on curves, from

Hilton Railway bridge to a point 2¾ miles above same, following in general the methods described in the report of the district officer and under the conditions of local cooperation recommended by the Board of Engineers for Rivers and Harbors, at an estimated cost of $50,750 for first construction and $3,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $25,375, being the full share of the cost of the work to be borne by the United States.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 13, 1913.

The Chief of Engineers, United States Army:

1. A general history and description of this river are given in the report on preliminary examination. The district officer submits a plan and estimate for improvement for a channel 20 feet in depth and 150 feet bottom width in the sum of $37,000, and for a channel of the same width and 22 feet in depth in the sum of $50,750, the maintenance for either channel being estimated at $3,000 per annum.

2. The total tonnage for this stream is given as 150,019 for the calendar year ending December 31, 1911, valued at approximately $1,800,000, of which about 42,000 tons, valued at about $770,000, is credited to that portion of the lower river where improvement is desired. Owing to the recent completion of a third fertilizer factory, it is expected that the commerce for 1912 will be considerably larger. The district officer states that it is difficult to get light-draft vessels to carry phosphate rock, one of the principal commodities used by the fertilizer factories; that vessels drawing about 20 feet are the least that can be obtained; and that these vessels require lighterage at Wilmington of from 700 to 800 tons each before they can reach the factories. This lighterage increases the cost of the phosphate rock and makes it cheaper under present conditions to receive it by rail. A depth of 20 to 22 feet would result in a material saving in the cost of this commodity. The improvement proposed extends about 2¾ miles above the mouth of the river, about 1½ miles above the present deep-water project in front of the city of Wilmington.

3. The district officer expresses the opinion that present and prospective commerce justify improvement by the General Government in accordance with the larger estimate. The division engineer is of opinion that a channel having a width of 150 feet will have a tendency to fill, that the estimate for maintenance is not sufficient, and that the channel should have a width of 300 feet and a depth of 22 feet, in order to exert a directive influence on the flow of water. He believes that if the channel suggested by the district officer, at a cost of $50,000, is provided, its eventual cost may reach double that sum, and he is not prepared to say that the improvement is worthy of an expenditure of $100,000.

4. From the information now available it appears that the three fertilizer industries located about a mile above the head of the deep-

water project at Wilmington have now a considerable tonnage that would be affected by a more commodious channel and that such a channel would result in a material saving in the handling of their heavier commodities. The improvement is very largely in the interest of these concerns, and a direct benefit would accrue to them and an indirect benefit to the general public.

5. In view of the conditions existing here, it seems to the board that these interests should contribute at least toward the work of first construction if the improvement is undertaken by the United States. A letter from them to the district officer states, for reasons given, "we should not be called upon to share in the expense of this improvement, but that the same should be done and maintained by the Government"; and further, "should you, after considering the above facts, still feel that we should bear a portion of the expenses, that we should be glad to have you advise us what portion in your judgment we should pay in order to secure the desired and necessary improvement."

6. After careful consideration the board reports that in its opinion the conditions, present and prospective, justify the Federal Government in participating in this improvement under proper conditions of cooperation, and that it is advisable for the United States to undertake the construction of a channel 150 feet wide and 22 feet deep, as proposed by the district officer, at an estimated cost of $50,750 and an annual maintenance charge of $3,000, provided local or other interests will contribute one-half the estimated cost, $25,375, of first construction. While, as suggested by the division engineer, it may be found desirable to increase the width of this channel in order to lessen the probable cost of future maintenance, it would seem best to first adopt the project width proposed by the district officer and await results, particularly as the work will be of such a character that the channel can be readily enlarged if found necessary. The board concurs with the district officer that it will be advisable to have the whole amount available if the work is undertaken, and it therefore recommends that the first appropriation by the United States be $25,375, to be expended upon condition that local interests contribute a like amount, as indicated above.

7. In compliance with law, the board reports that except as contemplated by the above recommendations, there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interest of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF NORTHEAST CAPE FEAR RIVER, N. C.

Engineer Office, United States Army,
Wilmington, N. C., November 24, 1911.

Sir: In accordance with your requirement of April 7, 1911, in pursuance of section 2 of the river and harbor act of February 27, 1911, the following report on preliminary examination of Northeast

Cape Fear River, N. C., from its mouth to Hallsville, is respectfully submitted:

2. Assistant Engineer Robert C. Merritt, of this office, who has been connected with the improvement of the stream for many years and in immediate supervision of it for the past few years, submits the following report, which seems to cover the situation and be based on thorough knowledge thereof:

Previous examinations of this river are published in the annual report of the Chief of Engineers and House documents, as follows:

Date of examination.	Published in annual report.		Published in House document.			Portion of river.	Nature of report.
	Year.	Page.	No.	Congress.	Session.		
1884	1885	1128	71	48	2	Whole river	Unfavorable, but recommended removing obstructions near mouth.
1889	1890	1181	35	51	1	do	Faverable.
1895	1895	1389	322	53	3	Lower 2½ miles	Unfavorable.
1905	....	....	229	59	1	Whole river	Continuation of project recommended; no additional improvement.
1910	....	....	867	61	2	Lower 2½ miles	Favorable, provided interested parties would pay two-thirds of cost.

This river has been under improvement since 1889, the project of that date being still in force and including the clearing of the natural channel for small steamers to Hallsville and for pole boats to Kornegays Bridge. During the past 10 years no work has been done above Chinquepin.

Northeast Cape Fear River rises in the extreme northern part of Duplin County, flows in a general southerly direction through Pender and New Hanover Counties, and empties into the main Cape Fear River at Wilmington. It has a total length of about 130 miles (70 miles in a straight line). In its upper portion it is about 12 miles distant from the Atlantic Coast Line Railroad; during the lower 90 miles it is never more than 6 miles away from this railroad.

At ordinary low water a draft of 8 feet can be carried to Rocky Point Landing, 35 miles above Wilmington; 6 feet to Smiths Bridge, 52 miles above Wilmington; and 3 feet to Crooms Bridge, 56 miles above Wilmington. The next 24 miles (from Crooms Bridge to Chinquepin) is navigable for boats drawing 3 feet for about eight months during the year, when the water is up. For the next 8 miles (up to Hallsville) the stream is narrow, shallow, and crooked, and is suitable mainly for the use of pole boats and rafts, but steamboats drawing 3 feet occasionally reach this point during high stages. Between Hallsville and Kornegays Bridge, 103 miles above Wilmington, it is only suitable for pole boats and rafts during freshet stages. The minimum low-water depth to Rocky Point Landing is 8 feet; to Smiths Bridge, 6 feet; to Crooms Bridge, 3 feet; to Chinquepin, less than 1 foot; to Hallsville, 0.5 foot; and to Kornegays Bridge, about 0.1 foot.

The lower portion of the river is tidal, there being a tidal range of about 2½ feet at Wilmington, which decreases to nothing at Crooms Bridge. The upper portion is subject to freshets of from 8 to 12 feet. These freshets are liable to occur at any time, but during the summer low stages usually prevail.

Between Kornegays Bridge and its mouth this river receives several tributaries, which bring in a moderate amount of water at all times of the year and large quantities during freshets, and are used during a large part of the year by small boats, pole boats, and rafts. In 1882 and 1883 $6,000 was spent by the United States in one of these tributaries (Long Creek or Lillington River), which enters the river about 14 miles above Wilmington.

The lands on both sides of the river are good agriculturally, and timberlands are extensive and embrace a large variety of timber.

Below Kornegays Bridge the stream is crossed by eight county bridges and two railroad bridges, of which the three upper county bridges are without draws. The draws in the two railroad bridges are about 60 feet wide and those in the county bridges are about 25 feet wide. Most of the county bridges are in bad condition, draws hard to operate, and considerable trouble is had with the county authorities in getting them to provide parties to open draws.

There are several sawmills along the river, located as follows: Twenty-seventh mile board, 1 sawmill and 1 shingle mill; thirty-fifth mile board, 1 shingle mill; forty-second mile board, 1 shingle mill; forty-fifth mile board, 1 sawmill; forty-eighth mile board, 1 sawmill; fifty-second mile board, 1 sawmill; and at seventy-third mile board, 1 small sawmill.

At present the steamer *Duplin*, a small shallow-draft boat of 37 net tons, makes two trips each week between Wilmington and Smiths Bridge, and occasionally to Chinquepin when the water is up. Two small power boats are regularly engaged in towing flats loaded with lumber from mills at Smiths and Bannermans Bridges.

The commerce of the river for the calendar year ending December 31, 1910, was as follows (season of navigation, navigable the entire year):

Vessel classification.

Class.	American.	Net registered tonnage.	Passengers.
Registered:			
Steamers	2	60	680
Tugs	11	228	
Unregistered:			
Flats	44	2,200	
Rafts	100		
Total	157	2,488	680

Freight traffic.

Articles.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
UPSTREAM.				*Miles.*	
Brick	312,000	780	$2,340	55	$0.016
Cottonseed meal ... tons	235	235	5,875	55	.03
Coal ... do	250	250	875	3	Cargo.
Fertilizer ... do	2,145	2,145	64,350	55	.03
Fertilizer materials ... do	16,616	16,616	332,240	3	Cargo.
General merchandise ... do	1,940	1,940	291,000	55	.10
Grain ... bushels	10,176	254	8,890	55	.033
Hay ... bales	7,500	375	7,500	55	.033
Lumber ... feet b. m.	250,000	500	5,000	25	.0225
Machinery and railroad iron ... tons	806	806	80,600	45	.033
Total upstream		23,901	798,670		
DOWNSTREAM.					
Cotton ... bales	1,576	394	98,500	55	.05
Cotton seed ... bushels	11,150	223	4,460	55	.033
Cross-ties	21,750	1,359	9,513	50	(1)
Eggs ... crates	2,069	41	16,400	55	.21
Live stock	1,379	69	6,900	55	.033
Lumber ... feet b. m.	15,000,000	30,000	300,000	45	(2)
Poultry	10,000	22	4,400	55	.17
Peanuts ... bushels	23,200	348	27,840	55	.04
Potatoes ... do	1,400	42	1,050	55	.033
Poles and piles	2,550	638	3,190	50	(3)
Rosin ... barrels	3,408	446	13,380	55	.02
Shingles	6,250,000	3,125	25,000	45	.033
Turpentine:					
Crude ... barrels	1,533	230	8,050	55	.02
Spirits ... casks	881	198	35,640	55	.06
Tar ... barrels	1,456	255	4,080	55	.025
Timber ... feet b. m.	18,068,000	54,204	216,816	40	(3)
Wood ... cords	4,550	4,550	18,200	35	(3)
Total downstream		96,144	793,419		
RECAPITULATION.					
Freight traffic:					
Upstream		23,901	798,670		
Downstream		96,144	793,419		
Total for stream		120,045	1,592,089		

[1] Rafted and flatted. [2] Flatted. [3] Rafted.

Passengers transported, 680; revenue therefrom, $340.
Transportation lines established during the year, none.

All of the fertilizer materials and coal passed over only the lower 3 miles of the river. About 90 per cent of the down freight, except timber and its products, is received from points between the forty-eighth and seventy-ninth mile boards and transported to Wilmington, about 70 per cent of it being received between the forty-eighth and fifty-second mile boards, and practically all of the upstream freight, except fertilizer materials and coal, is received at Wilmington and transported to the same points, about 70 per cent of it being carried to points between the forty-eighth and fifty-second mile boards. About 16,000,000 feet of the timber is received from points above the forty-eighth mile board and is transported to sawmills between the twenty-seventh and fifty-second mile boards, and about 75 per cent of this is stopped at mills between the forty-eighth and fifty-second mile boards. About 2,068,000 feet of the timber is received from points below the forty-eighth mile board, and about this amount comes through to Wilmington. Practically all of the lumber and shingles come to Wilmington from mills between the thirty-fifth and fifty-second mile boards. All of the poles, piles, crossties, and wood come to Wilmington from various points along the river.

There are three large fertilizer factories located on the west bank less than a mile above Hilton Bridge. Two of the factories have been in operation for several years, but the third factory has just been completed and is just beginning operations. On the east bank, just above the bridge, there is a large sawmill plant, but there is now a depth of 25 feet to their plant.

These fertilizer factories receive their raw material from abroad or from distant points in the United States in seagoing vessels drawing from 18 to 22 feet, and it is necessary that they be lightered to a considerable degree before they can reach the factories, as the maximum draft that can be carried to the factories is only about 16 feet. The aggregate output of these factories is valued at over $2,000,000 per year.

Surveys have been made of only the lower 2½ miles of the stream.

3. The latest two examinations cover the situation virtually as it exists at present on the two separate parts of the stream. There are two entirely different questions in connection with its improvement, first covering what is really the extension of the Cape Fear River at and below Wilmington to include the stretch of the river immediately above the railroad, and, second, improvement for ordinary river navigation in the upper reaches.

4. The latter may be dismissed at once as being entirely impracticable at any reasonable expense beyond the scope of the work covered by the present project—there has been available for this river since the project was adopted 21 years ago an average of roughly $1,500 per year. A survey of any accuracy to permit formulation of a plan of improvement would cost several times that sum and therefore the money might better be saved to use for maintenance of the completed project improvement—estimated at from $3,000 to $5,000 per year.

5. No question of wharfage, etc., would enter, as the extent of banks available would preclude denial of access to the stream to anyone legitimately desiring it. With any at present reasonable improvement no water power, drainage, flood control, or similar undertaking could be allied with the improvement operations. No terminal or transfer facilities exist other than the common landings.

6. It is, however, entirely a different matter with the lower deep-water part of the stream. As presented in 1910 report. the question is not so much as to whether the commerce, considered by amount only, justifies the work needed (which seems to be conceded) as it is as to how payment for the work will be made since the commerce is altogether for the very special interests with landings above the Hilton Bridge. Actual work on the improvement already made on the 1¼ miles below the bridge does not extend above property used or apparently purposed for general transportation, though this gives, by connecting with natural deep water near the bridge, that depth up

to the bridge. However, the draw span is not in the best natural depth, and through it there is less than 28 feet.

7. I do not appreciate that conditions have radically changed since the 1910 report was submitted to Congress, and as the only question was then, apparently, as to payment by private interests for part of the work I believe that intrinsically the commerce justifies the probable cost of needed improvement. I believe also that the question as to distribution of cost should be settled by some general policy applicable under determined rules rather than by local views in an individual instance.

8. In deciding on this it should, of course, be realized that those who will be directly individually benefited by any expenditure on the part of the Government have already been, and will in future be, large participants in the benefits derived from expenditures farther down. If this work is undertaken, it would much better, for many reasons, be obtained by an extension of the project for Cape Fear at and below Wilmington.

9. The interested concerns, the fertilizer manufacturers, ask this particularly that they may be relieved from extra costs on vessels for incoming cargo chartered to Wilmington, which in many cases refuse to go to the works, which they contend are not on Wilmington Harbor, to which their charter reads. These interests hope that the congressional legislation for the improvement will be so worded as to make the portion of the river past their wharves part of Wilmington Harbor. This does not, however, seem to me a compelling reason—apparently the same result could be more readily effected by local and State legislation extending the boundaries of the city of Wilmington to include the works and removing restrictions preventing erection of fertilizer works within the city limits so far as applied to the district where they now are—thus incidentally bringing them within the taxable area, possibly why they prefer it done by congressional action.

10. On this part of the river there is little if any opportunity for the establishment of general transportation wharves, terminals, or transfer facilities and no probability that such will ever be needed. The harbor would here be purely an industrial one for the benefit of the materials utilized in manufacturing interests immediately on its banks, and they can be relied on to provide such terminals as they may need. No water power, reclamation, flood control, or drainage is involved with the improvement.

11. No new survey would be necessary to the preparation of an estimate for this work, but if such estimate is ordered an allotment of $75 should be made to cover the expenses incidental to its preparation in this office.

12. I recommend the improvement of the lower section of the river as above covered with such distribution of the expenses incident thereto as may be decided upon by superior authority and the continuation of improvement on the upper section in accordance with the existing project with an annual appropriation therefor in accordance with estimates already submitted in annual and other previous reports.

Very respectfully,

L. H. RAND,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

WAR DEPARTMENT,
OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
Savannah, Ga., November 28, 1911.

1. Respectfully forwarded to the Chief of Engineers, United States Army.

2. I do not agree with the district officer in thinking that this examination was intended to refer particularly to the North East Cape Fear River in the immediate vicinity of Wilmington. The language of the law is "North East Cape Fear River, N. C., from its mouth to Hallsville," and it may well be presumed that Congress intended the examination to cover this entire stretch.

3. The portion of the river in the immediate vicinity of Wilmington has been carefully considered and made the subject of a report dated January 26, 1910, in which both the district officer and the division engineer agreed that the proposed improvement was not worthy of being undertaken by the General Government.

4. From the report of Assistant Engineer Merritt it appears, however, that the portion of the river near Hallsville is in a very unsatisfactory condition and, indeed, that the river is only navigable the year around up to Crooms bridge, 56 miles above Wilmington. Hallsville is 32 miles farther up. Part of this distance is navigable by steamboats for eight months in the year. The rest of it (the last 8 miles) is stated as narrow, shallow, and crooked and suited mainly for the use of poleboats and rafts.

5. It must be borne in mind that the character of boats used in the navigation of small rivers is undergoing a change due to the extensive use of the gasoline engine, which enables much smaller and light-draft boats to be used and boats which can tow small, light-draft barges to good advantage.

6. I think that Congress desired to know what could be done with this particular section of river, and I think that on the statement made of its commerce and the description of its present condition that it is worthy of a survey, and I would recommend that the matter be returned to the district officer to prepare an estimate of the cost of such a survey.

DAN C. KINGMAN,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, May 27, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The existing project for the Northeast Cape Fear River provides for the clearing of the natural channel for small steamers to Hallsville, a distance of 88 miles above Wilmington, and for pole boats to Kornegays Bridge, a further distance of 15 miles. The low-water depth reported is 8 feet to Rocky Point, 35 miles; 6 feet to Smiths Bridge, 52 miles; 3 feet to Crooms Bridge, 56 miles; less than 1 foot to Chinquepin, 80 miles; and one-half foot to Hallsville, 88 miles above Wilmington.

3. There are several saw and shingle mills along the river, and on the lower portion there are now three large fertilizer factories. There is a miscellaneous commerce amounting to 120,045 tons, a large part of which is timber and its products or fertilizer materials, the latter being confined to the lower reach. Shallow-draft vessels operate with more or less frequency as far up as Smiths Bridge, and occasionally to Chinquepin, and partially lightered seagoing vessels in connection with barges and small boats handle the waterborne traffic at the fertilizer factories on the lower river.

4. The district officer states that two questions are involved in the present consideration, the first covering an extension of the deep water at Wilmington to include the river immediately above the railroad bridge so as to accommodate the business of the fertilizer factories, and second, improvement for light-draft river navigation above. With reference to the latter he states that any improvement beyond the scope of the present project would involve unreasonable expense, and therefore is not advisable. With reference to the extension of deep water in the lower river, he states that the fertilizer factories receive their raw material from abroad or from distant parts of the United States in seagoing vessels drawing from 18 to 22 feet, and these have to be lightered before they can reach the factories. The improvement is desired principally to permit these vessels to reach the factories without lightering. He believes that conditions have not radically changed since 1910, as presented in House Document No. 867, Sixty-first Congress, second session, when the question was not so much the desirability of the work as whether the interests to be benefited would bear a part of its cost. He believes that intrinsically the commerce justifies the probable expense, and that the question of the distribution of the cost should be left to higher authority. The division engineer looks with more favor on the improvement of the upper river than does the district officer, and he believes it is worthy of a survey.

5. Being in doubt as to the advisability of any further improvement of this stream, the board requested that the district officer so inform interested parties and give them an opportunity of presenting their views. This was done, and on May 13, 1912, Hon. F. M. Simmons, United States Senator, and a delegation from the locality appeared before the board in behalf of an increase in channel depth to 20 feet.

6. It appears that since the report of 1910 was submitted a new fertilizer plant has been established in this vicinity which adds materially to the commerce of the locality. These factories are modern, up-to-date structures requiring large quantities of raw material for their finished products, and they could and no doubt would make use of the improvement now contemplated, as much of the material used is carried on deep-draft vessels. The channel would also be used to some extent by sawmill and lumber interests.

7. In the opinion of the board it is not advisable to undertake any improvement of the upper river beyond the scope of the present project. It is considered desirable, however, to determine the cost of the improvement of the lower river, and to ascertain whether those in interest will contribute toward the work, and if so, to what extent, before expressing a final opinion as to its advisability. It is

therefore recommended that the district officer be authorized to prepare an estimate and make all necessary investigations as to cooperation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF NORTHEAST CAPE FEAR RIVER, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., December 4, 1912.

From: The district engineer officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Survey report, Northeast Cape Fear River, N. C.

1. This river and the history of its improvement is fully described in Capt. L. H. Rand's report on its preliminary examination dated November 24, 1911.

2. This river flows into the Cape Fear River at Wilmington, the city lying on the eastern banks of the two rivers, extending about 1¼ miles along the Northeast Branch to Hilton Bridge, where the river is crossed by a railroad bridge having a draw span of about 60 feet clear opening. Below this bridge the Northeast Branch forms a part of Wilmington Harbor and has been improved under the project for improving Cape Fear River N. C., at and below Wilmington. It now has a depth of 28 feet at mean low water for a width of 150 feet.

3. The plan and estimates are for that portion of the river only which lies between Hilton railway bridge and a point 2¾ miles above the mouth of the river.

4. Above Hilton Bridge the river increases in width from about 500 feet to about 1,300 feet opposite Smiths Creek, which results in the formation of a shoal. Above this point it again becomes narrow and deeper. There are two shallow channels through this shoal—one on the east side and one on the west side. The channel on the west side has been improved twice by private parties to provide access to the fertilizer works. The first work was done in 1906 and the second in 1909. About 16 feet can be carried to the fertilizer works.

5. There are located on the western bank of this portion of the river three fertilizer plants as follows: About 3,000 feet above the bridge, American Agricultural Chemical Co.'s plant; 4,000 feet above, Virginia-Carolina Chemical Co.'s plant; and 5,000 feet above, Swift Fertilizer Works. On the eastern bank, about 600 feet above the bridge, is located Camp Manufacturing Co.'s sawmill. Two of these fertilizer plants and the sawmill have been in operation for several years, but the third fertilizer plant—that of the American Agricultural Chemical Co.,—was completed and started operations the latter part of last year.

6. The commerce for this river for the calendar year ending December 31, 1911, was as follows:

Freight traffic.

Articles.	Amount.	Amount, in short tons.	Value.	Average haul or distance freight was carried.	Rate per ton-mile.
UPSTREAM.				*Miles.*	
Brick	335,000	838	$2,514	50	$0.01
Coal ... tons	250	250	1,000	50	.03
Cottonseed meal ... do	65	65	1,950	52	.03
Fertilizer ... do	3,037	3,037	91,110	52	.03
Fertilizer materials ... do	30,021	30,021	600,420	2	Cargo
General merchandise ... do	1,799	1,799	269,850	52	.10
Grain ... bushels	6,950	174	6,090	52	.03
Hay ... bales	5,920	296	8,288	52	.03
Lumber ... feet	28,570	57	570	25	.02
Machinery ... tons	155	155	15,500	49	.03
Total		36,692	997,292		
DOWNSTREAM.					
Cotton ... bales	1,268	317	79,250	52	.05
Cotton seed ... tons	372	372	7,440	52	.03
Crossties	10,352	647	4,529	50	Rafted.
Eggs ... crates	1,185	30	12,000	52	.22
Fertilizers ... tons	1,000	1,000	30,000	2	Flatted.
Live stock:					
Cattle ... head	145	36	3,600	52	.03
Horses ... do	25	12	2,400	52	.03
Hogs ... do	867	43	8,600	52	.03
Lumber ... feet	19,050,000	38,000	380,000	51	Flatted.
Laths	1,500,000	375	2,250	50	Flatted.
Poultry ... head	5,853	12	2,400	52	.18
Peanuts ... bushels	18,460	189	15,120	52	.042
Potatoes ... do	575	17	595	52	.035
Poles and piles	1,100	275	2,200	50	Rafted.
Rosin ... barrels	3,896	623	18,690	55	.02
Shingles	6,255,240	3,128	25,024	40	Flatted.
Turpentine:					
Crude ... barrels	285	43	1,290	55	.026
Spirits ... casks	531	119	21,420	56	.06
Tar ... barrels	571	86	1,462	55	.025
Timber	21,334,348	64,003	256,012	35	Rafted.
Wood ... cords	4,000	4,000	16,000	35	Rafted.
Total		113,327	890,282		
RECAPITULATION.					
Freight traffic:					
Upstream		36,692	997,292		
Downstream		113,327	890,282		
Total		150,019	1,887,574		

7. These statistics show a total commerce up and down stream of 150,019 tons, valued at $1,887,574, of which the following originates or terminates on the first mile above Hilton Bridge or in the portion improvement is asked for: Fertilizer materials, 30,021 tons, valued at $600,420; fertilizer, 2,500 tons, valued at $75,000; and 9,597 tons of lumber, valued at $95,970; total, 42,118 tons, valued at $771,390. The third fertilizer plant was not completed or put into operation until the very last part of 1911; therefore the tonnage and value of the fertilizer and fertilizer materials for 1912 will very probably increase 50 per cent, making the total commerce originating or terminating on this portion of the stream during this calendar year 58,378 tons, valued at $1,109,100.

8. As the depth of water in the river below Wilmington is increased, the draft of vessels coming to Wilmington correspondingly increases,

this being the case especially with foreign vessels bringing fertilizer and fertilizer materials.

9. During the present calendar year the three fertilizer factories will receive at their plants materials about as follows:

	Tons.	Value.
Phosphate rock	34,000	$204,000
Pyrites	36,000	216,000
Potash	30,000	390,000
Nitrate of soda	8,700	382,800
Miscellaneous	5,000	119,000
Total	113,700	1,311,800

Of this, the 34,000 tons of phosphate rock will be received by rail and about 35 per cent of the other materials stopped at Wilmington and transported to the factories by rail or lighters.

10. It is difficult to get light-draft vessels to carry phosphate rock, only vessels carrying about 1,800 tons, drawing about 20 feet, can be obtained. Such vessels require lighterage at Wilmington of from 700 to 800 tons before they can reach the factories. This increases the cost and makes it cheaper to receive this rock by rail. A depth of 20 or 22 feet to these factories would enable them to place this rock at the factories by water at a saving of about 30 cents per ton, and also enable them to save the cost of transporting about 35 per cent of other materials from Wilmington to the factories by rail or lighters.

11. A personal inspection of the plants located on the banks of this portion of the river has been made by the present district officer, a thorough examination being made of two of the fertilizer plants in all the details of their operation. The parties interested were communicated with as to cooperation, and letter [1] from this office and reply [1] dated August 29, 1912, are attached hereto.

12. A conservative estimate of the actual investments affected by the proposed improvement in this locality only is more than one and one-fourth million dollars.

13. As stated in the preliminary examination report, paragraph 3, the portion of this river up to Hilton Bridge is really the extension of the Cape Fear River at and below Wilmington, and its improvement has been prosecuted under appropriations under that title, the depth provided for in existing project being 26 feet.

14. From the bridge to a point about 2¾ miles above Wilmington estimates for two projects are presented: First, for a channel 150 feet wide and 22 feet deep; second, for a channel of the same width and 20 feet deep. In both projects the channel locations are the same and the channel is extended above the upper factory so as to connect with deep water at that point. Allowances of 1 foot for excess depths and side slopes of 1 on 2 are provided for in the estimates. Both projects are for improvement by dredging only.

Either of these channels at mean low water will have a minimum width of 150 feet and the first a minimum depth of 22 feet, the second a minimum depth of 20 feet, these widths and depths being considered suitable for boats of a maximum draft of 20.5 feet and 18.5 feet respectively.

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[1] Not printed.

The first project requires the removal of 406,000 cubic yards of sand and mud, at an estimated cost of $50,750, with an annual maintenance of $3,000.

The second project requires the removal of 296,000 cubic yards of sand and mud at an estimated cost of $37,000, with an annual maintenance of $3,000.

The location of the proposed channel is shown on the accompanying map.

15. In my opinion, present and prospective commerce justify the improvement by the General Government in accordance with the first project. The adoption of the second project would be a present help, but would not sufficiently meet the needs which will soon exist, and the expense involved would be greater by first adopting the minor project and later increasing to the greater depth.

16. In case of the adoption of either project, the full amount should be provided in the initial appropriation, as the work should be completed in less than one year.

H. W. STICKLE,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
December 6, 1912.

The CHIEF OF ENGINEERS;

1. Shoal water exists in this portion of Northeast River because it is a great wide place, two or three times as wide as the normal width, and the water spreads out over it and the place is a settling basin.

2. In my opinion a channel 150 feet wide will last but a short time. I do not think that $3,000 a year will be sufficient to maintain it. In order to be a success the channel ought to be 300 feet wide and 22 feet deep; then it would be deep enough to exert a directive influence on the flow of the water. In other words, the water would follow the channel and not spread out all over a wide area. The excavated material should be dumped out toward the other bank of the stream and used to raise up a sort of bar or point, such as naturally exists in crooked rivers. Of course, some of this might wash back, but it would help to maintain a stable condition of flow.

3. If the improvement is worthy of being made at all, it is worthy of being made in the way that I have described. If we spend $50,000 in making a 150-foot channel, it is my prediction that we will spend $50,000 more in the next 10 or 12 years in keeping it open, and we will have an unsatisfactory channel most of the time.

4. I am not prepared to say that the improvement is worthy the expenditure of $100,000 at this time, but when the improvement is made it should be made as I have described it.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey, see page 3]. .

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1357.

GLOUCESTER HARBOR, MASS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION OF GLOUCESTER HARBOR, MASS., WITH A VIEW TO REMOVAL OF CERTAIN LEDGES IN HARBOR COVE AND SECURING A DEPTH OF 15 FEET.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, February 4, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 3d instant, together with copy of a report from Col. Frederic V. Abbot, Corps of Engineers, dated November 29, 1912, on preliminary examination of Gloucester Harbor, Mass., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War

War Department,
Office of the Chief of Engineers,
Washington, February 3, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Gloucester Harbor, Mass.

1. There is submitted herewith for transmission to Congress report dated November 29, 1912, by Col. Frederic V. Abbot, Corps of Engineers, on preliminary examination of Gloucester Harbor, Mass., with a view to removing certain ledges in Harbor Cove and securing a

depth of 15 feet, called for by the river and harbor act of July 25, 1912.

2. The work performed by the United States for the improvement of Gloucester Harbor includes the construction of a breakwater at the entrance, the removal of a number of rock shoals in the inner and outer harbors, and the dredging of Harbor Cove to a depth of 10 feet. Under date of March 29, 1912, the Chief of Engineers, by authority of the Secretary of War, approved an application of the Board of Harbor and Land Commissioners of the Commonwealth of Massachusetts for permission to dredge Harbor Cove to a depth of 15 feet. The dredging was completed, but certain rock ledges which were thereby uncovered were left projecting above the general level of the bottom. The dredging done by the State terminates 50 feet outside of the line of existing piers, and local owners desire the removal of the ledge up to the pierheads in addition to the removal of the portion within limits of the State dredging.

3. For reasons stated, the district officer is of opinion that the proposed work inside of the 50-foot limit is of a private nature and should not be done by the United States. The other ledges complained of are within the area dredged by the State, and the district officer believes that their removal is properly within the functions of the State and belongs to the State rather than to the United States. He therefore expresses the opinion, in which the division engineer concurs, that Harbor Cove is not worthy of further improvement by the United States to the extent indicated by the clause ordering the preliminary examination.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur, in general, with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Gloucester Harbor, Mass., with a view to removing certain ledges in Harbor Cove and securing a depth of 15 feet, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The United States completed the dredging of this cove to a depth of 10 feet in 1893, and in 1912, under the authority of the Secretary of War, the Board of Harbor and Land Commissioners of the State of Massachusetts dredged the cove to a depth of 15 feet,

with the exception of certain ledges, the removal of which is now desired. The mean rise and fall of the tide is 8.9 feet. The commerce of Gloucester for 1910 is given as 214,266 tons, and the district officer states that perhaps one-third of this was handled in Harbor Cove.

2. The limited area of the cove and its crowded condition makes the presence of the ledges a serious obstacle to the mooring and handling of vessels. The dredging done by the State terminates 50 feet outside of the line of existing piers, and local owners desire the removal of the ledge by the United States up to the pierheads, in addition to that uncovered by the State, it being claimed that the cost of this work is too great for individual wharf owners to undertake. The district officer believes that if any work of ledge removal is undertaken by the United States, it should be limited to the adopted 50-foot line, as the area adjacent to the wharves is usually used by the owners for mooring purposes; and, as such area forms no part of a through channel, he believes it should not be dredged by the United States.

3. The State survey indicates that only about 500 cubic yards of ledge has been left above the 15-foot depth in the dredged area, and the district officer believes that its removal belongs properly to the State rather than to the United States, and his investigation indicated that it was the current local opinion that all work to a depth of 15 feet in the cove was to be done by the State. The district officer is of opinion that further improvement of the cove by the United States is unworthy of being undertaken, in which view the division engineer concurs.

4. The usual notice of unfavorable report was sent out by the district officer, affording opportunity for any who desired to submit their views to the board, but no communications on this subject have been received.

5. It appears that the State of Massachusetts has undertaken to provide the necessary depth in this small inner harbor, limiting excavation to a line 50 feet outside of the pierheads, and that two ledges have been exposed with slightly less than the project depth on them. After due consideration, the board concurs in the opinion of the district officer and the division engineer that any work found necessary between the 50-foot line established by the State and the pierheads should be done by the respective wharf owners, and that the work undertaken by the Commonwealth of Massachusetts in the cove is properly a function of and should be completed by the State. The board reports therefore, that, in its opinion, it is not advisable for the United States to undertake the improvement of Gloucester Harbor, Mass., with a view to removing certain ledges in Harbor Cove and securing a depth of 15 feet.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF GLOUCESTER HARBOR, MASS.

UNITED STATES ENGINEER OFFICE,
Boston, Mass., November 29, 1912.

From: The United States Engineer Officer, Boston, Mass.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Gloucester Harbor, Mass.

1. In compliance with instructions contained in letter dated August 3, 1912, and with provisions of the river and harbor act approved July 25, 1912, the following report is submitted on the preliminary examination of Gloucester Harbor, Mass., with a view to removing certain ledges in Harbor Cove and securing a depth of 15 feet.

2. *Work already done.*—The river and harbor act of August 5, 1886, appropriated $2,000 for a survey of Gloucester Harbor. The survey was completed in December, 1886, and, based on that survey, the annual report of 1887 contained a recommendation that Harbor Cove be dredged to 10 feet at mean low water. The river and harbor act of August 11, 1888, appropriated $10,000 for dredging Harbor Cove and for certain ledge removal outside of Harbor Cove. Two channels in Harbor Cove 40 feet wide and 10 feet deep at mean low water were dredged, leaving, however, a small ledge off Parmenter's wharf. The river and harbor act of September 19, 1890, provided $15,000 for Gloucester Harbor. With a part of these funds the two channels in Harbor Cove were widened by November 30, 1891, to 140 feet each. The river and harbor act approved July 13, 1892, appropriated $40,000 for Gloucester Harbor. With part of these funds the dredging of Harbor Cove to the depth of 10 feet was completed in September, 1893.

Under date of March 29, 1912, the Chief of Engineers, by authority of the Secretary of War, approved an application of the Board of Harbor and Land Commissioners of the Commonwealth of Massachusetts, dated March 19, 1912, for authority to dredge Harbor Cove, in the city of Gloucester, to the depth of 15 feet. The plan accompanying the request showed the entire area of Harbor Cove to be the locality which the State proposed to dredge to a depth of 15 feet. The dredging was completed, but certain ledges which were thereby uncovered were left projecting above the general level of the bottom. Except on those ledges, the entire cove now has the depth of 15 feet.

3. *Navigable extent.*—Harbor Cove is perhaps the busiest part of the inner harbor of Gloucester, but is of very limited area, being, as defined by the lines of existing pierheads, 1,100 feet long, 550 feet wide at the entrance, narrowing to 100 feet at the inner end. Between piers the longest slip is about 450 feet long by about 60 feet wide.

4. *Maximum draft now carried at mean low water.*—Barring the ledge areas, 15 feet can now be carried up to the limit at which the State terminated its recent dredging, namely, 50 feet outside of the State harbor lines. In case the United States should undertake the removal of the remaining ledges a number of the wharf owners are urgent in asking that they be removed up to the pierheads.

5. *Rise and fall of water surface.*—The range of spring tides is 10.1 feet, of neap tides 7.6 feet, and of mean tides 8.9 feet.

6. *Headroom and clear span of bridges.*—There are no bridges over Harbor Cove.

7. *Unusual difficulties in navigation.*—The shallow depth and contracted area of the cove, together with its habitually congested condition, several schooners lying abreast at the heads of many of the wharves, make the presence of the shallow ledges a dangerous and troublesome feature for navigators trying to land sailing craft.

8. In accordance with section 2, subparagraphs (*a*), (*b*), and (*c*) of river and harbor act approved July 25, 1912, the following data have been secured in regard to the subjects therein listed.

(*a*) *Terminals.*—There are 23 piers grouped round the shores of the cove, of which 4 are connected with the coal business, one having a traveling crane, overhead tracks and chutes for loading tugs, the others only gins, operated by power on a floating lighter towed from place to place as needed; one is a lumber wharf, one is used for making vessels' spars, one is a public landing, one is a cold-storage plant, one is a ferry, and the rest are mostly occupied actively in the fresh fish or salt fish business. All have access to good streets and are provided with suitable inclosed sheds, etc., needed for active prosecution of their several classes of business. The public landing place is the only one not improved, being at the extreme inner end of the cove, and apparently little used; it is open to all water carriers on equal terms. The other wharves are privately owned, but the conduct of the fishing business is such that a very large number of privately owned fishing craft secure free berths at almost any of the wharves for the purpose of disposing of their cargoes of fish. It is naturally to be supposed that this arrangement is contingent on the purchase of the cargo by the wharf owner or lessee, but questioning did not bring out this feature of the case very clearly. Considering the small area of Harbor Cove as compared with the entire harbor of Gloucester, the private terminals in the cove are adequate and efficient. For the same reason there is no necessity for construction of additional public terminals in Harbor Cove.

(*b*) *Water power.*—No questions of water power, floods or land reclamation are involved, and the case does not seem to be one where any special wharf owner should be required to contribute money to assist in doing the work. As the State has voluntarily done the dredging, this might, if anything is incumbent on the United States, be looked upon as a contribution.

(*c*) No other subjects appear to be properly connected with the project for ledge removal in Harbor Cove.

9. References to examination or survey reports and maps or plans not in project documents:

	Congressional documents.				Annual reports of Chief of Engineers.	
	House or Senate.	No.	Congress.	Session.	Year.	Page.
Removal of rock obstructions in Harbor Cove, 1884.[1]	House....	[2]169	48	2	[2]1885	540
Modifications, 1886, removing rock and dredging; additional rocks, 1897.[1]	....	....	....	....	[3]1887 [2]1897	500 835
Removal of ledges in Harbor Cove only to depth of 10 feet at mean low water, 1907–08.[4]	House	[3]1112	60	2	....	....

[1] Original project and modifications.

[2] No maps.

[3] Contains maps.

[4] Project for rock removal, June 25, 1910.

10. *Worthy or not worthy.*—The deepening of main entrance channels from the ocean, of through harbor channels used by vessels when passing into anchorages or into main branches of inner harbors, may be regarded as strictly the province of the United States; channels and fairways leading from such main channels and anchorages to private wharves or docks are perhaps more properly the province of the State, while dredging of dock slips is certainly not the province of the United States. The dimensions of Harbor Cove are not larger than the regular dock slips proposed by the directors of the port of Boston, nor than the slip recently undertaken by the State between the new fish pier and the Commonwealth Dock in South Boston. The State of Massachusetts has recognized such a division of jurisdiction as being fair by dredging over 3,000,000 cubic yards in Boston Harbor at Bird Island Flats to provide 126 acres of anchorage 30 feet deep (about 1 mile long and 1,000 feet wide), adjacent to one side of the national 35-foot channel; and by dredging 300,000 cubic yards (now in progress off the shore of South Boston under State appropriations) to establish deep-water connection between the Commonwealth and fish piers and the 35-foot channel. In the present case, except for two ledge areas, the State has just dredged Harbor Cove to the depth called for in the preliminary examination. An argument based on the readiness with which the State has already appropriated money is perhaps weak; such State dredging may well be considered as an indication that the United States should do its fair share toward completing an improvement well justified by actual and prospective traffic. The United States has recognized Harbor Cove in the past as public waters under its care by dredging and rock removal to a depth of 10 feet at mean low water. The area dredged by the State terminates 50 feet outside of the line of existing piers, and local owners urge ledge removal by the United States up to the line of pierheads, on the ground that more than half the yardage of ledge in Harbor Cove above grade −15 lies between the State limit line and the wharves, and that the cost of removing such a quantity of submerged rock is too great for individual wharf owners to undertake. The State survey does not give sufficient data to determine the quantity, as its borings were not made to develop ledge areas inside of the 50-foot limit line. There are no United States harbor lines, so the prohibition of excavation within harbor lines at the expense of the United States (27 Stat. L., 111) does not apply, and furthermore this area 50 feet wide lies outside of the State harbor lines.

In this district it has not been unusual to leave a zone 50 feet wide undredged by the United States to avoid injury to private wharves where they extended out to the limiting line of the approved project. If any work of ledge removal in Harbor Cove be undertaken by the United States, the excavation should, it is thought, be kept outside of the 50-foot limit because such a width in the immediate front of a private wharf is in reality part of the wharf property, being largely occupied by vessels lying at the pierhead; such water area forms no part of such a through channel for general navigation as is the proper subject of creation and maintenance by the General Government. Ledge removal in Harbor Cove inside said 50-foot limit line is therefore unworthy of being undertaken by the United States.

The State survey indicates in a general way that outside of this limit there is only about 500 cubic yards of ledge above the plane 15 feet below mean low water. The conclusion seems to be justified that the work is properly within the functions of the State rather than of the United States, and therefore that the whole cove is not worthy of further improvement by the United States to the extent indicated by the clause ordering the preliminary examination.

11. *Interested parties.*—Every effort has been made to reach parties likely to be interested in the improvement. At the time the examination was made there was a public meeting at the rooms of the Master Mariners' Association in Gloucester, at which many persons concerned in fishing and navigation, including a large proportion of the interested wharf owners, were present, and all were encouraged to state their views. At this meeting a number expressed surprise that the War Department was taking up the question when it had been understood by them that the State appropriation fully covered all that was desired at this time.

That this was a general understanding is evidenced by the following extract from a letter from the Secretary of the Gloucester Board of Trade dated November 21, 1912, in reply to one from this office asking for recent commercial statistics, etc., which it had been proposed to append to this report.

> Your favor of the 18th is at hand with regard to a report on the desirability of removing certain ledges in Harbor Cove to a depth of 15 feet at mean low water.
>
> Replying would say that on the occasion of your visit it was suggested that the writer get out such a report as you mention, but the writer was of the impression that at the conclusion of our conversation it was deemed advisable to endeavor to get the State to complete the work of dredging rather than to attempt it through the Federal Government.
>
> It was felt, as you will no doubt remember, that on account of the necessary delay which would be entailed in the endeavor to obtain a Federal appropriation and also taking into consideration the fact that the State has not exhausted its appropriation which was made for this specific purpose, the logical way would be to urge the State to complete its work.
>
> If you now feel that a report on this matter would be desirable the writer will take up the matter at once upon receipt of your advice to this effect.

12. *Commerce.*—In view of what precedes, it seems undesirable to further delay this report, or to put the board of trade to the trouble of preparing special data as to the commerce of Harbor Cove. As stated at the beginning of the report (par. 3), Harbor Cove is perhaps the busiest part of the inner harbor of Gloucester. At its wharves is handled perhaps one-third of the whole commerce of that harbor, which was reported in the last annual report as follows:

Commercial statistics.

Articles.	1907	1908	1909	1910
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*
Coal	64,238	48,932	55,634	53,165
Lumber	1,910	2,117	3,163	2,502
Brick	500	800	1,000	756
Stone, sand, and gravel	272	437	....	200
Oil	407	527	931	1,155
Iron	183	250	....	157
Salt	44,250	32,702	33,817	47,981
Fish and fish products	96,839	96,771	95,018	79,684
Wood	4,462	3,512	2,925	1,669
Ice	781	....	428	....
Fertilizer material	209	764	375	....
Tar	750	250	250	....
Livers	....	....	1,256	....
Sugar	....	....	....	15
Molasses	....	....	....	3
Miscellaneous	18,715	22,012	23,368	26,979
Total	233,516	209,074	218,165	214,266
Passengers carried	80,000	80,000	82,000	70,000

Vessel classification, 1911.

Class.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	1,279	4	1,283	348,260	42,000
Sailing vessels	1,374	44	1,418	209,035	....
Barges	23	....	23	3,734	....
Miscellaneous	64	....	64	691	....
Unregistered:					
Steamers	50	....	50	....	....
Sailing vessels	1	8	9	....	....
Unrigged	1,038	....	1,038	....	....
Total	3,829	56	3,885	561,720	42,000
Sailing vessels	6	....	6	(1)	....
Barges	12	....	12	(1)	....
Grand total	3,847	....	3,903	....	....

Freight traffic.

Articles.	Customary units.		Amount in short tons.	Valuation.
	Amount.	*Unit.*		
Fish and fish products	106,054	Tons	106,054	$9,852,626.02
Coal	49,924	....do	49,924	187,281.00
Plaster	170	....do	170	580.00
Salt	26,279	....do	26,279	158,237.98
Do	2,000	Hogsheads	560	3,000.00
Oil	172,844	Gallons	990	27,607.68
Wood	921	Cords	2,303	5,580.00
Do	40	Tons	40	450.00
Lumber	32,000	Feet	3,045	50,450.00
Do	40	Tons	40	1,800.00
Ballast	400	....do	400	600.00
Brick	500,000	Number	1,000	4,000.00
Miscellaneous	1,050	Tons	1,050	159,000.00
Total	....	....	191,855	10,451,212.68
Miscellaneous	31,678	Tons	31,678	(1)
			223,533	

[1] Not ascertainable.

14. As no improvement of Harbor Cove is recommended as worthy of being done by the United States, there is no necessity for a survey.

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, December 2, 1912.

To Chief of Engineers: Concurring in the recommendations of the district engineer.

W. M. BLACK,
Colonel, Corps of Engineers.

[For report of Board of Engineers for Rivers and Harbors on preliminary examination, see page 2.]

O

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1358.

YAQUINA BAY AND BAR ENTRANCE, OREGON.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION OF YAQUINA BAY AND BAR ENTRANCE, OREGON.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, February 5, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Capt. H. H. Robert, Corps of Engineers, dated November 12, 1912, on preliminary examination of Yaquina Bay and bar entrance, Oregon, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 4, 1913.

From: The Chief of Engineers, U. S. Army.
To: The Secretary of War.
Subject: Preliminary examination of Yaquina Bay and bar entrance, Oregon.

1. There is submitted herewith for transmission to Congress report dated November 12, 1912, by Capt. H. H. Robert, Corps of Engineers, on preliminary examination of Yaquina Bay and bar entrance, Oregon, including consideration of any proposition for cooperation

on the part of local interests called for by the river and harbor act approved July 25, 1912.

2. Yaquina Bay and bar entrance have been improved by the construction of converging jetties and the removal of submerged rock at a total cost of about $710,000. As a result of an examination made in 1903, work was discontinued by the United States. No examinations of the entrance have since been made, but the improvement of the river up to Toledo has been recommended in cooperation with local interests, and the report on this subject is now before Congress. At the present time the outer ends of both jetties have been beaten down and submerged for several hundred feet in length at low water. There are at present two channels across the bar, one well to the north crossing the line of the north jetty and the other to the southwest, with an extensive shoal middle ground between. The bar was in unusually bad condition the past summer, and the controlling depth in the two bar channels as reported by vessel masters did not exceed 8 or 9 feet at mean low tide and the maximum draft that could safely cross the bar at high tide was about 11 feet.

3. The district officer states that the present commerce of Yaquina Bay is not large; that there are no large industries established on the bay; and that the cost of restoring the jetties to their original condition or any other further improvement of the bar entrance would be very great as compared with the amount of commerce to be benefited thereby. No favorable response has been received to his request for submission of any proposition for cooperation on the part of local interests. He therefore expresses the opinion, in which the division engineer concurs, that the locality is not worthy of further improvement by the General Government at the present time.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors and attention is invited to the board's accompanying report of January 6, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Yaquina Bay and bar entrance, Oregon, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 6, 1913.

The CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Under the original and modified projects for Yaquina Bay and bar entrance this harbor has been improved by the construction of converging jetties and the removal of submerged rock, at a total cost of about $710,000. The jetties were completed in 1895 and resulted in securing the contemplated depth of 17 feet at ordinary high tide. The commerce of Yaquina Bay has never been large, and as a result of an examination made in 1903 work at this harbor was shortly afterwards abandoned. The outer ends of both jetties have been beaten down and submerged for several hundred feet in length at low water, and there are at present two channels across the bar with extensive shoal middle ground between. Reports state that the controlling depth in the two bar channels during the past year did not exceed 8 or 9 feet at mean low tide. The range of tide at Newport, near the entrance, is 7.1 feet and at Toledo, 12 miles above Newport, about 6 feet. The work of restoring the jetties would require new wharves, new trestlework, and a new plant, and would therefore be expensive.

2. With reference to the question of cooperation, the district officer states that the citizens of Toledo have formed a port district and raised by the sale of bonds the sum of $50,000 for the purpose of improving the channel of Yaquina River up to Toledo. Work has been carried on by that district, but it does not extend down to the harbor entrance. There has also been established the port of Newport, covering the territory adjacent to the bay proper. This district, however, is neither large nor wealthy, and it would be unable to raise any very considerable sum. The district officer states that no favorable reply has been received from anyone in response to inquiries as to the amount the interested locality would be willing to furnish in cooperation with the Government in the further improvement of the harbor. There are no towns of importance and but a few small ones in this vicinity, and the adjacent country is sparsely settled.

3. With reference to the improvement desired, it is stated that some would like to see the existing jetties restored and extended with a view to an increased depth across the bar and a more permanent channel. Others request only a survey to determine present conditions. The district officer states that the present commerce of Yaquina Bay is not large, that there are no large industries established on the bay, and that the cost of restoring the jetties to their original condition or any other further improvement of the bar entrance would be very great as compared with the amount of commerce that would be benefited thereby. He is therefore of opinion, in which the division engineer concurs, that Yaquina Bay and bar entrance are not worthy of further improvement by the General Government at the present time.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their

views to the board, but no communications on this subject have been received.

5. It will be seen from the history of this harbor that while there has been a considerable expenditure of public funds, resulting, for a time at least, in very fair harbor conditions, the commerce has been quite small, ranging from a few hundred tons to about 40,000 tons, that there have been no commercial industries of importance established, and that there is no prospect of any material increase in commerce in the near furure. In view of these conditions, coupled with the fact that there is no offer of cooperation, the board concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the United States to undertake any further improvement of Yaquina Bay and bar entrance at the present time.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF YAQUINA BAY AND BAR ENTRANCE, OREGON.

Portland, Oreg., *November 12, 1912.*

From: Capt. H. H. Robert, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer, Northern Pacific Division).
Subject: Report on examination of Yaquina Bay and bar entrance, Oregon.

1. In compliance with instructions contained in department letter dated August 3, 1912, the following report of a preliminary examination of Yaquina Bay and bar entrance, Oregon, including consideration of any proposition for cooperation on the part of local interests as provided for in act of July 25, 1912, is submitted:

2. Yaquina Bay is a tidal estuary on the Oregon coast about 110 miles south of the mouth of the Columbia River. The bay proper is 3½ miles long and somewhat over a mile wide. The Yaquina River, a small stream rising in the coast mountains and flowing in a general westerly direction for about 30 miles, empties into its upper eastern end. The tidal area of the bay, including that of the Yaquina River up to Elk City, 20 miles from the entrance, is about 5 square miles. The mean range of tide at Newport, near the entrance, is 7.1 feet, the extreme range varying from 5 to 11 feet. There is a mean discharge, mainly tidal, of 40,000 cubic feet per second. The entrance to the bay from sea is between a low sandy spit on the south and a headland of soft sandstone, covered with loose sand, on the north. The bar itself is composed of fine sand overlying flat rocky reefs, to an uncertain depth, with projections here and there to or above the general covering of sand. At a dis-

tance of about 1 mile offshore is located a broken reef of rock, which parallels the coast. At several points the depth on this reef does not exceed 8 feet at low tide. It contains many gaps, with depth of several fathoms of water, one of which opposite the entrance provides a safe approach for vessels.

3. Between the outer edge of the bar and this outer reef, the distance is about a quarter of a mile, with depths of from 4 to 6 fathoms. The outer reef has a material effect on the entrance by sheltering it to some extent from the heavy storm seas that usually come from the west and southwest. Although the reef has been in a measure an assistance to works of bar improvement, and is still a protection to the entrance channel obtained, its presence would, no doubt, as stated in previous reports, complicate further improvement by any considerable extension of the jetties seaward.

4. Originally before improvement there were 3 shifting channels across the bar with a controlling depth of about 7 feet at mean lower low tide, and the maximum draft that could safely be carried across the ocean bar at high tide was only about 8 or 9 feet. Vessels that were able to cross the bar could proceed up the bay and river without difficulty at high tide, for a distance of 12 miles. After the jetties at the entrance were completed in 1895, the least depth in the bar channel was about 12 feet at mean lower low tide, and vessels drawing as much as 15 feet could and did cross the bar for a time. The steel steamer *Francis Leggett* of 1,606 tons gross, took out a load of about 1,000,000 feet b. m. of lumber in June, 1907, on a 16.6-foot draft.

5. The ship channel in the bay and river for a distance of about 4 miles from the gorge varies in width from 150 feet to 700 feet with a least depth of 18 feet at mean lower low tide. In the deepest portions it slightly exceeds 5 fathoms. The anchorage area over 18 feet in depth has an area of about one-third square mile.

6. There are but two towns in the locality. Newport, near the entrance, with practically no manufacturing industries, and chiefly of importance as a summer resort with a permanent population of 1,400, which is temporarily increased during the summer to about 4,000, and Toledo, the county seat of Lincoln County, situated on Depot Slough near its junction with the Yaquina River, 12 miles above Newport, with a population of 600. At this place there are two sawmills (with a combined capacity of 125,000 feet b. m. per day), and a small creamery. There is a small settlement of about 100 people at Yaquina, the terminus of the Corvallis & Eastern Railroad, about 3 miles east of Newport, and also a smaller one at Oysterville, a short distance above, near which place is located a salmon cannery. At Elk City, a short distance below the head of tide on the Yaquina River, is another small sawmill with a daily capacity of 12,000 feet b. m. Elk City is a small village of something over 150 people.

7. The country surrounding and tributary to Yaquina Bay is sparsely settled. Most of the timber on the Yaquina watershed was destroyed by fire many years ago. The country is rough and hilly; the bottoms along the river and streams although not extensive are very fertile and produce hay, vegetables, fruit, and dairy products.

8. The commercial importance of Yaquina Bay is due to the fact that it is the sea terminal of a railroad 142 miles long running from

near the summit of the Cascade Mountains through the towns of Albany and Corvallis, which are in the fertile and productive Willamette Valley, and are on the main lines of the Southern Pacific Railway.

9. The following is a list of previous examinations of Yaquina Bay and reference to the documents in which the reports thereon may be found:

Section covered.	Congressional documents.				Annual reports of Chief of Engineers.	
	House or Senate.	No.	Congress.	Session.	Year.	Page.
Entrance[1]	Senate	148	46	2	1880	......
Do.[1]	do	47	51	1	1890	......
Do.[1] [2]	do	30	52	1	1892	......
Do.[1]	House	96	52	2	[2] 1893	3314
Do.[1]	do	227	53	3	[2] 1895	3459
Do.[1]	do	68	54	1	[2] 1896	3284
Do.[1]	do	110	56	1	[2] 1900	4293
Do.[1]	do	158	58	2	[2] 1904	3449

[1] Contains maps.

[2] Contains no maps.

10. Yaquina River has been examined in the following years: In 1896, 1902, 1909, and 1911, and the reports thereon will be found in House Document No. 112, Fifty-fifth Congress, second session, and House Document No. 240, Fifty-eighth Congress, second session; House Document No. 351, Sixty-first Congress, second session; House Document No. 519, Sixty-second Congress, second session.

11. The original project for the improvement of the entrance to Yaquina Bay was approved by the Secretary of War June 14, 1891, and provided a plan for expending the appropriation of $40,000 made by act of June 14, 1880, previous to the regular survey of the department. This plan contemplated the building of a short south jetty to secure 17 feet at ordinary high tide. Active work was commenced in the spring of 1881. The project was modified in 1888, to provide for a north jetty in addition to the original south jetty. Examinations were made in 1892 and 1894, with a view to ascertaining the worthiness of modifying or extending the existing project to secure an increased depth. Two converging high-tide rubblestone jetties, the south 3,748 feet long and the north 2,800 feet long, with outer ends 1,000 feet apart, were finally completed in 1895, at a cost of $685,000. The construction of these jetties resulted in securing the contemplated depth of 17 feet, at ordinary high tide, and for limited periods as much as 2 or 3 feet more. The sundry civil act of March 2, 1895, authorized an examination of Yaquina Bay, by a board of Engineer officers, with a view to a project for deeper water. This board in its report proposed a project to extend the two existing jetties and remove some detached rocks in the entrance, at an estimated cost of $1,025,800. The act of June 3, 1896, appropriated $25,000 and provided that a contract or contracts might be entered into by the Secretary of War for such materials and work as might be necessary to complete the work recommended by the board of Engineer officers, October 11, 1895, to be paid for as appropriations

might be made by law not to exceed $1,000,000. In 1899, a board of Engineer officers made an examination with a view to ascertaining the desirability of prosecuting the work authorized by the act of June 3, 1896. The board's opinion was that the commerce of the bay did not render it advisable to prosecute the work as authorized by the river and harbor act of 1896, except as it referred to the removal of the detached rocks in the entrance.

12. These rocks which protruded from the bedrock ledge underlying the bar, were removed by hired labor, using Government plant in the summer seasons of 1900 and 1901. The total appropriations for the Yaquina Bay improvement amount to $710,000, all of which was expended save $1,661.04 which reverted to the Treasury. A formal examination was made in 1903 by a board of Engineer officers, which board reported that the conditions did not warrant continuing improvement at that time, and not long afterwards the work was abandoned.

13. This preliminary examination was made by Assistant Engineer J. S. Polhemus during the month of August, 1912.

At the present time the outer ends of both jetties have been beaten down and submerged for several hundred feet in length, at low water. There are at present two channels across the bar, one well to the north crossing the line of the north jetty and the other to the southwest, with an extensive shoal middle ground between. The bar was in unusually bad condition the past summer, and the controlling depth in the two bar channels as reported by vessel masters, and believed by this office to be correct, did not exceed 8 or 9 feet at mean low tide, and the maximum draft that could safely cross the bar at high tide was about 11 feet.

14. Since this examination was made, however, conditions are reported to have improved somewhat, possibly by as much as 2 feet, a condition which is quite possible in view of the nature of the entrance. The present depth in the former navigable channel, and the only channel that is marked at present, is reported as only about 4 feet at low tide, and a small vessel, the *Pilgrim*, in attempting to come in on the present marked range, was recently capsized with the loss of five lives.

The change in bar conditions seems to have been quite marked in the past year or two. There appears to have been no correspondingly marked deterioration of the jetties in this period. The work of restoration of the jetties would require new wharves, new trestlework, etc., and new plant, as the old wharves and trestlework are completely destroyed so far as any further usefulness is concerned and have practically disappeared, and the plant formerly used has been sold, destroyed, or removed to other work. The last survey of Yaquina Bay and bar entrance was made in 1899.

15. The citizens in the vicinity of Toledo formed a port district in 1910, under the Oregon State laws, and raised by the sale of bonds the sum of $50,000 for the purpose of improving the channel of the Yaquina River to Toledo, so that those vessels that could cross the bar could pass on up to Toledo without difficulty. The port of Toledo purchased a parcel of land for a public wharf, built two pile and brush dikes and built a bucket dredge at a cost of about $16,000, and to this date has expended about $15,000 in dredging the shoals in the river and at the mouth of Depot Slough, so that the controlling low-water

depth from the entrance to Toledo, in a somewhat narrow channel, is not less than 6 feet at mean low tide. A project to complete this improvement with a view to obtaining 10 feet at mean lower low water for this section, in cooperation with the interested locality, has been recommended by the Board of Engineers for Rivers and Harbors, but not yet approved by Congress. (See H. Doc. No. 519, 62d Cong., 2d sess.) It is expected upon its completion the mills at Toledo will be able to ship lumber coastwise.

16. The Yaquina River is a small stream which takes its rise in the Coast Range of mountains about 30 miles in a direct line from the Pacific Ocean. Twenty-one miles from its mouth, at the settlement of Elk City, it is joined by its principal tributary Big Elk. The fresh water flow of both of these streams is inconsiderable. The tidal influence extends about 5 miles above Elk City on the main stream, and 3 or 4 miles up Big Elk Creek, which is as far as these streams are navigable, and then only for skiffs and small light draft scows. Above these points there is no present navigation and no possibility of future navigation on either stream.

17. At Elk City the river is about 160 feet wide; from that point to the mouth of Depot Slough, a distance of 9 miles, it gradually widens to about 800 feet. The controlling depth throughout this part of the river is about 3 feet at mean low tide, although many long stretches have depths of from 5 to 10 feet, and even more at the same stage. There is a silt shoal or bar in the river about 1 mile above the mouth of Depot Slough on which the ruling depth is 3 feet at mean low tide. Rocky Bar, 1½ miles below Elk City, caused by a bowlder slide, is also an obstruction, but can be passed by hugging the north bank. There are many snags in the river between Elk City and the head of tide on the river and on Big Elk Creek.

18. A mud bar originally blocked the mouth of Depot Slough leading to Toledo, on which the depth was but 2 feet at low tide, before a channel was dredged through it by the port of Toledo.

Depot Slough is navigable for small scows and skiffs for about two miles above Toledo. The average range of tide at Elk City is about 5½ feet and at Toledo about 6 feet. Freshets occasionally occur in the winter of variable heights, probably not exceeding 15 feet above the height of ordinary water, and of short duration, but they do not materially affect navigation. From the mouth of Depot Slough downstream to Oysterville, a distance of 6 miles, the river varies in width from 800 to 1,000 feet except at the first bend below Depot Slough where it is but 400 feet wide. The channel depths throughout this distance originally varied from 4 to 20 feet at low tide, but as previously stated has now been increased to about 6 feet. Between Oysterville and Yaquina, at the head of the bay, a distance of 2½ miles, the ruling depth at mean lower low tide is about 12 feet. The remaining 3 miles to Newport near the entrance has a controlling low-water depth of 17 or 18 feet. The banks of the Yaquina River between Yaquina and the head of tide are alluvial except where the rocky hills come down to the river. They are, however, fairly stable. The bottom of the river between the above points is composed of mud, silt, and sand with some bowlders, a short distance below Elk City.

19. The bottom lands of the valley of the Yaquina River, although not very wide, are fertile and produce dairy products, hay, vegetables, live stock, etc. The Corvallis & Eastern Railroad parallels the river

throughout its entire navigable length, but nevertheless the river is used extensively by the residents along its banks, at all seasons, about equally, to transport their products to market and to bring back supplies. The small sawmill at Elk City ships most of its lumber to local points by the river.

COMMERCIAL STATISTICS.

20. Commercial statistics on Yaquina Bay have not been collected since 1902. The following is a comparative statement of the commerce of the port for the years 1882 to 1902:

Year.	Commerce.	Depth mean high water.	Year.	Commerce.	Depth mean high water.
	Tons.			*Tons.*	
1882	1,830	14-17	1893	24,767	21
1883	1,359	17	1894	23,345	19-21
1884	4,995	19	1895	24,589	19-22
1885	9,951	18	1896	17,883	22
1886	6,249	20	1897	15,364	....
1887	24,694	18	1898	10,380	22
1888	23,431	21	1899	5,990	19
1889	32,921	18-19	1900	691	18
1890	40,074	18-19	1901	576	17-19
1891	27,540	18	1902	1,152	18-19
1892	27,111	17-22			

21. At the time of the adoption of the original project a railroad was commenced between Yaquina, a point on the bay, and the Willamette Valley, crossing the main line of the Southern Pacific Railroad at Albany. This railroad, now the Corvallis & Eastern Railway, was finished in 1888, and considerable freight was shipped from valley points to Yaquina Bay and thence to San Francisco by steamer. The railroad went into bankruptcy, the steamers were taken off the run, and the road finally passed into the control of the Southern Pacific. The only ocean commerce since has been that furnished by a few small coasters operating in competition with the railroad.

22. For a time the ocean commerce declined to almost nothing, but lately has been increasing. During the past fiscal year from July 1, 1911, to June 30, 1912, the following small vessels called at the bay, making 234 arrivals and departures, viz:

The gasoline schooner *Anvil*, of 362 tons; the gasoline schooner *Patsy*, of 150 tons; the gasoline schooner *Tillamook*, of 281 tons; the gasoline schooner *Wilhelmina*, of 100 tons; the gasoline schooner *Gerald*, of 30 tons; the gasoline sloop *Nenamosha*, of 8 tons; the gasoline sloop *Condon*, of 42 tons; the steam tug *L. Roscoe*, of 117 tons.

These vessels carried in and out over the bar during the year ending June 30, 1912, as shown by the records of the collector of customs at Yaquina, 10,065 tons of freight, of which 8,931 were feed, flour, implements, and general merchandise and cannery supplies, etc., 970 tons lumber, and 164 tons shingles. It is not known how much of this freight was left at Yaquina Bay points, but it is estimated that 3,000 tons remained on the bay. The *Ahwaneda*, a gasoline schooner of about 50 tons, built at Toledo, August, 1912, has a contract with the merchants to carry freight from Portland to bay points for $7 per ton, which is a considerable saving over rail freight.

23. Several tons of halibut were caught last summer on a bank about 16 miles southwest from Yaquina entrance, and a cold-storage plant is to be erected at Newport to handle the catch commercially on a larger scale in the future.

24. In the valley of the Siletz River, from 10 to 20 miles north of the Yaquina River, is said to be a very large body of unusually fine yellow fir and spruce timber, estimated at 8,000,000,000 feet b. m., much of which it is expected will find an outlet by way of a short railroad with easy grade down Depot Slough to the Yaquina River.

DESIRES OF LOCAL INTERESTS.

25. Some of those interested in Yaquina Bay as a shipping point would like to see the existing jetties restored and extended, with a view of securing an increased depth across the bar and a more permanent channel. Others, including the Port Commission of Newport, request only a survey at present to determine exactly the existing conditions and the cost of improving same. Others request only an authentic survey for the information of the public, claiming that since no survey has been made since 1899, the circulation of reports of less depth than actually exists at the entrance has hindered the development of commerce and retarded the establishment of industries, such as sawmills, in the locality, and that a Government publication of the existing conditions is necessary to remove this obstacle to development. It may be stated that such a survey as is requisite for the above-mentioned purpose could be made during favorable season for not to exceed $1,500, and that it would be of some benefit to commerce of the locality in view of the material changes in the hydrography at the entrance that have occurred since last survey was made.

26. There are already two port commissions in the locality organized under the State laws. The port of Newport for the territory adjacent to the bay proper has neither a large or wealthy district, and would be unable to raise any very considerable sum toward cooperation. This port proposes soon to build a public dock at Newport. The port of Toledo has already raised $50,000 by the sale of bonds, which it has nearly expended in the improvement of the channel to Toledo, and the citizens are not in a position to increase their taxation to any great extent for harbor-improvement purposes. No favorable reply has been received from anyone in response to inquiries as to the amount the interested locality would be willing to furnish in cooperation with the Government in further improving the harbor, although all those known to be interested were written to on the subject.

TERMINAL FACILITIES, ETC.

27. The port of Newport has been given a deed to a piece of land in front of block 6, Newport, between Front Street and the harbor line, with a deep water frontage of 300 feet, on which it proposes to construct a public wharf with a frontage of 140 feet in the near future. The city of Newport claims it was granted all the tide land in front of the town by the State legislature in 1885. It has disposed of some of it by sale or lease, including the above-mentioned piece, to the port. It owns yet 1,500 feet of water front, probably one-third of which may have been leased to private parties. However, the railroad from the

bay to Corvallis, then called the Willamette Valley Coast, was granted a subsidy by the State in 1874 of all the tide lands in Benton (now Lincoln County), subject to certain conditions, as an inducement to construct a road. This grant was renewed in 1878 and again in 1885, at which time all breaches of condition to that date were waived, but the tide land in front of Newport was excepted and granted to that town. The matter found its way into the courts, and in 1912 the supreme court of the State decided that the title to the tide lands passed to the railroad by the act of 1874, when it filed the necessary acceptance, the conditions being held to be subsequent. The matter of their fulfillment may yet be in dispute, but it is believed, however, that the city of Newport holds a good title to its tide land. The Corvallis & Eastern Railway holds a strong title to nearly all the remaining tide land and water frontage on the bay. At Newport there are a number of small private wharves and landings between Bay Street and Hurburt Street in front of the town.

28. The town of Toledo has a small municipal wharf with 100 feet frontage on Depot Slough not connected with the railroad tracks. The port of Toledo owns a frontage of about 600 feet on Depot Slough in front of Toledo, where it has already erected a public wharf 205 feet long on the channel. The tracks of the Corvallis & Eastern Railway run close to this wharf, but a spur has not been extended to it. There are a few small unimportant private wharves at Toledo. It is possible the railroad company may claim the tide land on which all these wharves are situated.

29. The Corvallis & Eastern Railway owns a wharf 350 feet long at Yaquina, its terminus on the bay, along the face of which its tracks run so that freight can be readily transferred between vessels and cars. A commodious warehouse is built on the wharf alongside the tracks. The railroad controls this property in its own interests. There are no mechanical facilities for handling freight at any of the wharves in the localities named in this region.

30. There is no valuable water power available on Yaquina Bay, it being tidal.

CONCLUSIONS.

31. The present commerce of Yaquina Bay is not large. There are no large industries established on the bay. It is not believed the prospective commerce will be of great importance until the movement of the large body of timber in the Siletz Valley, by way of Yaquina Bay, commences to take place.

32. The cost of restoring the jetties to their original condition or of any other further improvement of the bar entrance would be very great as compared with the amount of commerce that would be benefited thereby.

33. The interested localities are not prepared to contribute any money to the further improvement of the bar in cooperation with the General Government at present.

34. It is believed that the present depth on the bar is sufficient for the present needs of commerce and that the marketing of the timber mentioned in paragraphs 24 and 31 of this report will furnish the principal demand for and utilization of any future increased depth of Yaquina Bay and Bar entrance. There is no sufficient indication that such considerable demand will occur in the immediate future.

35. It is my opinion that Yaquina Bay and Bar entrance are not worthy of further improvement by the General Government at the present time.

HENRY H. ROBERT,
Captain, Corps of Engineers.

(Through the Division Engineer, Northern Pacific Division.)

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
NORTHERN PACIFIC DIVISION,
San Francisco, Cal., November 14, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY:

Concurring in the views expressed by the district officer.

THOS. H. REES,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1359.

TONAWANDA CREEK AT NORTH TONAWANDA, N. Y.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION FOR DEEP-WATER CONNECTION WITH SUITABLE TERMINALS THAT MAY BE ESTABLISHED AT NORTH TONAWANDA AT HEAD OF NEW YORK STATE BARGE CANAL.

February 6, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, February 5, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit, herewith, a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from Lieut. Col. J. G. Warren, Corps of Engineers, dated June 26, 1911, on preliminary examination of Tonawanda Creek at North Tonawanda, N. Y., made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 4, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Tonawanda Creek at North Tonawanda, N. Y.

1. There is submitted herewith for transmission to Congress report dated June 26, 1911, by Lieut. Col. J. G. Warren, Corps of

Engineers, on preliminary examination called for by the river and harbor act approved February 27, 1911, for a deep-water connection with suitable terminals that may be established at North Tonawanda at the head of the New York State Barge Canal.

2. Tonawanda Harbor is about 12 miles down Niagara River from its head and is reached by lake vessels of not over 15 feet draft via the river channel improved under the project for improvement of Tonawanda Harbor and Niagara River, N. Y., which provides for a channel 400 feet wide and 18 feet deep at mean river level from Lake Erie to the north line of North Tonawanda; and also provides for a depth of 18 feet in Tonawanda Harbor. The completion of the improvement of Black Rock Harbor and Channel, project to be completed in 1912, will provide a 23-foot channel from Lake Erie to the mainland frontage at the mouth of Tonawanda Creek, where the New York State Barge Canal will join Niagara River.

3. The district officer states that the improvement now proposed under the title of this examination implies the deepening of Tonawanda Creek, and the approach thereto in Niagara River, not only in so far as now included in the Niagara River and Tonawanda Harbor project for 18 feet depth, but also deepening farther up that creek for a distance of at least 1 mile and at most 12 miles, the depth desired by interested parties being 23 feet. The proposed improvement is set forth in the report of the New York State Barge Canal Terminal Commission dated March 1, 1911. The district officer believes that the extensive utilization of a deep-water terminal at the proposed site is problematical and that barges will prefer to load and discharge their cargoes at Buffalo. In the Niagara River ample depth and width are available for transfer of cargo from vessel to barge, and vice versa, while the capacity of Tonawanda Creek limits the proposed channel to a bottom width of only about 150 feet. Aside from these features of the case, however, it appears that the barge canal connection with Niagara River will not be completed for two or three years, and that definite action by the United States at this time would be premature. For the reasons stated, the district officer is of opinion that the locality is unworthy of improvement by the General Government at the present time, and the division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors and attention is invited to its report herewith dated August 2, 1911, concurring with the views of the district officer and division engineer. The board invites attention to the fact that the question of issuing bonds for the construction of the barge canal terminals must be submitted to the will of the people of the State of New York before it can become enacted into law. The district officer has since reported that the barge canal terminal law was approved at the general election in November, 1911, but that the State engineer has not yet begun plans, and will not begin plans, for the proposed terminals until some time in 1913, and that they will therefore not be constructed and ready for use for two years or more to come.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore,

in carrying out the instructions of Congress I report that the improvement by the United States for a deep-water connection with suitable terminals that may be established at North Tonawanda at the head of the New York State Barge Canal, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, August 2, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. It appears that in connection with the New York State Barge Canal project there is contemplated at its western end the establishment of suitable terminals, and that recommendation has been made by a State commission for such both at Buffalo and at Tonawanda, the latter to be located on the banks of Tonawanda Creek. The improvement contemplated in the item of law calling for this examination is a channel to connect the deep water of the Niagara River with these terminals. An examination of the map of Niagara River and Tonawanda Creek shows the latter to be about 200 feet wide, over a small portion of which only is there a depth in excess of 12 feet, while the former has a width of about 1,800 feet and a depth of 20 to 30 feet for a distance of 5 miles above Tonawanda.

3. Between the lines of development existing and proposed along the banks of this creek there can be constructed a channel with a bottom width of only 150 feet. As the law provides for a consideration of a connection with "suitable terminals," the question at once presents itself as to the suitability of terminals located on a channel 150 feet wide, which are designed to accommodate lake vessels of 20 to 21 feet draft, 500 to 600 feet in length. Unless adequate facilities for such vessels are made available, the usefulness of the connecting waterways would be restricted, and it is probable that much of the business would seek other terminals.

4. It is brought out by the district officer that barges going east find the greater part of their cargo at Buffalo, and therefore could meet the deep-draft vessels there as well as at Tonawanda. Moreover, transfer from vessel to barge could be effected in the wide and deep reaches of the Niagara River. This lends an additional element of doubt as to the advisability of the project now under consideration. It is stated in the current issue of an engineering journal that the question of the issue of bonds for the construction of the barge canal terminals must be submitted to the will of the people of the State at the next general election before it can become enacted into law. The whole project is therefore as yet a tentative one, and definite action on the part of the United States at this time would appear premature. In

view of all the facts, the board concurs in the opinion of the district officer and the division engineer that the locality should not be regarded as worthy of improvement by the General Government at this time.

5. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on this subject have been received. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects that have any material bearing upon the questions under consideration.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF TONAWANDA CREEK AT NORTH TONAWANDA, N. Y.

United States Engineer Office,
Buffalo, N. Y., June 26, 1911.

Sir: In compliance with instructions in department letter of April 7, 1911, I have the honor to submit the following report on preliminary examination for a deep-water connection with suitable terminals that may be established at North Tonawanda at the head of New York State Barge Canal.

2. "Deep-water connection" is understood to mean a channel way from Tonawanda Harbor, Niagara River, N. Y., to "suitable terminals" in Tonawanda Creek, a tributary of Niagara River dividing the cities of Tonawanda and North Tonawanda and forming a part of the Erie Canal, now being enlarged and deepened to 12 feet for the New York State Barge Canal.

3. The locality is shown on United States Lake Survey chart of "Buffalo Harbor and Niagara River to the Falls," Index No. 312.

4. Tonawanda Harbor is about 12 miles down the Niagara River from its head at Horse Shoe Reef Light, Lake Erie, and is reached by lake vessels of not over 15 feet draft via the river channel improved under the project for "Improvement of Tonawanda Harbor and Niagara River, N. Y.," which provides for a channel 400 feet wide and 18 feet deep at mean river level from Lake Erie to the north line of North Tonawanda; and also provides for 18 feet depth in Tonawanda Harbor.

5. The channel of the project is completed except in the "rapids" at the Buffalo Waterworks intake pier, where the 18-foot natural channel has a width of about 100 feet; and from the Tonawanda Iron & Steel Co.'s front to the north line of North Tonawanda, where there is a natural depth of 12 to 15 feet.

6. Improvement of the "rapids" channel has not been made for the reason that the 23-foot channel of the project "Improvement of Black Rock Harbor and Channel," to be completed in 1912, will supplant and in all respects excel the river channel; and moreover, will secure a 23-foot channel from Lake Erie to the mainland frontage

at the mouth of Tonawanda Creek, where the New York State Barge Canal will join Niagara River.

7. In the project "Improvement of Tonawanda Harbor and Niagara River, N. Y.," "Tonawanda Harbor" comprises the river frontage of Tonawanda and North Tonawanda, N. Y., extending three-fourths of a mile above and 3 miles below Tonawanda Creek, which separates the two cities; also all of the water front of Tonawanda Island, which lies in the river off the main shore, and Tonawanda Creek from its mouth to the highway bridge connecting the Tonawandas, a distance of about 1,400 feet. This harbor frontage is all occupied by lumber docks, except the frontage of the Tonawanda Iron & Steel Co. furnaces, and the commerce is almost exclusively timber products and iron ore received from Great Lakes ports.

8. The channel in the main river abreast of Tonawanda Island and around the foot of the island to the Tonawanda Iron & Steel Co.'s dock at North Tonawanda is 18 feet deep at mean river level. Along the docks below the Tonawanda Iron & Steel Co.'s front there is a depth of from 12 to 15 feet at mean river level, and this part of the channel of the project has not been deepened because commercial interests do not as yet require it.

9. The waterway or channel between the mainland and Tonawanda Island might be termed the inner harbor of Tonawanda. It is about 1⅛ miles long and generally 400 feet wide, and is crossed near its midlength by a center-pivot-swing railroad and highway bridge connecting Tonawanda Island with the mainland. Several small slips and the harbor portion of Tonawanda Creek (for 1,400 feet to the highway bridge) connect with this part of the harbor above the bridge. A center-pivot-swing railroad bridge crosses Tonawanda Creek 450 feet above its mouth. All of Tonawanda Harbor and Tonawanda Creek channel is 18 feet deep at mean river level.

10. There is a lift lock connecting the Erie Canal and Tonawanda Creek about 1,000 feet above the mouth of the creek. Size of lock, 110 feet long, 18 feet wide, 7 feet deep, lift 4 feet. The New York State Barge Canal construction will eliminate this lock and secure direct connection between the canal and river at river level.

11. Report of a previous examination and survey of the locality is printed with map in House Document No. 143, Fifty-Sixth Congress, first session, and without map in Report of the Chief of Engineers for 1900, page 4152 et seq.

12. Pursuant thereto, the dredging of Tonawanda Creek "up to the State Dam" was included in the project and funds appropriated by the river and harbor act of June 13, 1902, and the creek deepened 160 feet wide to 18 feet at mean river level 1,400 feet up from its mouth to the fixed highway bridge, which limits navigation. The cost of this deepening was $11,882.50, for the removal of 37,293 cubic yards, scow measure, of sand, clay, mud, and sunken logs.

13. The improvement proposed under the title of this preliminary examination implies the deepening of Tonawanda Creek and the approach thereto in Niagara River, not only in so far as now included in the Niagara River and Tonawanda Harbor project for 18 feet depth, but also implies deepening farther up that creek for a distance of at least 1 mile and at most 12 miles. The depth desired by interested parties is 23 feet.

14. The proposed improvement is set forth and its object believed to be fully treated in the report, printed in two volumes, of the New York State Barge Canal Terminal Commission, transmitted to the legislature March 1, 1911. This commission investigated and determined the locations and extent of terminals deemed necessary for the barge canal from Buffalo, N. Y., to New York City.

15. The report on the proposed Tonawanda terminal is as follows:

The cities of Tonawanda and North Tonawanda are situated at the junction of Niagara River and Tonawanda Creek, about 10 miles north of Buffalo. The United States Government is just completing the deepening of a channel from Lake Erie to the Tonawandas that will be 23 feet in depth, so that the largest vessels of the Great Lakes may be accommodated up to that point. The State's westerly end of the barge canal finds outlet into Niagara River at the Tonawandas.

At the present time the State dam located in Tonawanda Creek just above the Webster Street bridge limits any deepening of the channel from the Niagara River for the accommodation of lake vessels above that point. With the removal of this dam, already provided for, this limitation will no longer exist, and it is reasonable to expect that the United States Government, realizing the great commercial and industrial possibilities which would thus be opened up, will provide a 23-foot channel in the creek.

These most important changes will alter greatly the conditions and possibilities existing along the banks of the stream and the adjacent territory. Thus favorably situated for a great industrial and commercial development, the future of these two cities, once their superior advantages of location are appreciated, with a deep water connection with the Great Lakes, with barge-canal connections to the east, and with rail connections with nearly a dozen trunk railroads radiating in almost every direction, may be said to be practically unlimited. The land lying along the banks of this creek by natural configuration is so well adapted to a tremendous development that this commission, after careful consideration, has decided upon a recommendation involving something of a departure in undertakings by the State. It is believed by the commission that enough of this waterfront should be the property of the State that it will be impossible for the railroads or haphazard private enterprise to throttle its development commercially or industrially. There will still remain plenty of room for the railroads and ample opportunities for them to connect with the waterfront, but it is not proposed to permit them, by the construction of freight yards and switches, to destroy a section adapted by nature and artificial means already employed, for the development to a high degree of an industrial and commercial center. In the immense level area of land contiguous to this section, there is ample room for greater railroad freight yards than will ever be required, without encroaching upon the domain of the waterways. Tonawanda Harbor has a commerce amounting to 1,500,000 tons. There has been expended on the harbor by the United States Government to date $659,700.

Statistics are unavailable as to the extent of the manufacturing industries of Tonawanda, but those of North Tonawanda are at hand. In the latter city there were in 1905 38 establishments with a capital of $4,824,887, whose miscellaneous expenses amounted to $335,165, and which paid for materials used the sum of $4,534,356, their finished products being valued at $6,499,312. In that year these establishments employed 2,025 wage earners, to whom $994,026 were paid in wages. The city of Tonawanda is situated on the south side of Tonawanda Creek at its junction with the Niagara River. The city of North Tonawanda lies north of it on the opposite side of the creek. Because of their contiguity in location and interests, they form practically a unit, so far as industry and commerce are concerned.

There is at present constructed, as a part of the barge-canal enterprise, sections of concrete vertical wall lying on both sides of the creek between Main Street and the Lehigh Valley Railroad bridge. In front of these walls there will be, at the completion of the barge-canal work, at least 12 feet of water. For the local terminal needs of the Tonawandas, the commission therefore recommends that this vertical wall be reserved for docking purposes; that the land lying between Main Street, the Lehigh Valley bridge, the southerly boundary of Sweeney Street, and the creek, be reserved and developed for terminal purposes, and that such of this land as is not in the possession of the State be acquired. That there be erected upon this property a concrete-steel one-story shed 150 feet long by 30 feet wide, located so as to provide for an extension when necessary; and that the balance of the dock area be suitably paved; that on the opposite side of the channel, back of the vertical wall already constructed, the land not now in the possession of the State lying between Main Street, the Lehigh Valley Railroad bridge, and the northerly boundary line of Niagara Street be acquired, and together with such land as is now State owned, included by the above-named boundaries and the face of the dock walls, be suitably paved and reserved for public terminal purposes. This will provide public docking space to a total of 2,180 feet in the twin cities, adequate freight transferring machinery to be installed as required.

It is estimated that the cost of these improvements, including the purchase of about three-tenths of an acre of land, will amount to $52,150.

The commission further recommends that a turning basin large enough to permit of the turning of a boat 300 feet in length be constructed about 2,000 feet easterly of Division Street. The cost of excavating such turning basin is estimated to be $17,850.

The commission renews its recommendation that the bridges over Tonawanda Creek between the cities of Tonawanda and North Tonawanda, which bridges it is necessary to reconstruct in whole or in part, owing to the canal improvement, be rebuilt of a type which will provide for a channel with unlimited headroom.

The commission further recommends that the Federal Government be urged to take up the improvement of Tonawanda Creek, with the ultimate end of providing a channel at least 23 feet in depth for a distance of 3 miles, and that this improvement be continued easterly as fast as the industrial and commercial need for it requires.

In order to protect the valuable water front, which will become available by reason of the deepening of this creek to 12 feet by barge canal operations and the further deepening by the Federal Government, from being utilized in such a manner as to prevent the greatest return direct or indirect for the expenditures thus made, the commission is of the opinion that the State should acquire a strip of land on either side of the improved channel, which it can from time to time develop for commercial or industrial purposes, and, if it is deemed advisable, lease such sections of it as may be required for either purpose, under long-term leases.

The commission therefore recommends that the State buy lands, in addition to what it now owns, sufficient to provide a strip of land bordering on the south side of Tonawanda Creek canalized, 500 feet wide and extending 11,000 feet easterly from Hanover Street in the city of Tonawanda, and also a strip of land of similar width bordering upon and on the north side of Tonawanda Creek canalized, extending easterly from Division Street in the city of North Tonawanda 8,000 feet.

It is estimated that this property can be acquired for $100,000.

The total estimated cost of the development above recommended for the Tonawandas is $170,000.

A plan showing in outline the location and development of the terminal herein recommended is attached to and forms a part of this report.

16. Pursuant to the terminal commission's report, a bill was introduced in the legislature providing for the adoption by the State of the terminals as planned, with minor amendments, and the appropriation of funds for their construction in the amount of about $19,000,000. This bill is still pending (June 26, 1911).

17. In order to obtain additional information and to give persons interested in the proposed improvement full opportunity to express their views, a circular letter was sent out, which resulted in a public hearing at this office on June 8, 1911, and the submission then, and subsequently, of written statements of views; all as shown by the papers hereto attached (not printed).

18. Perusal of these papers shows that they are in accord with the recommendations of the terminal commission, all having in view the provision of terminal facilities for "great commercial and industrial possibilities," and advocating the adoption of the specific plans proposed in order to secure terminals owned by the public; in contradistinction to existing terminal facilities in Tonawanda Harbor, all private owned and served by one railroad.

19. Consideration of the question naturally turns to two queries, viz: What are the existing terminal facilities? and, What are the physical and engineering features involved in the proposed improvements, and their cost? Under existing conditions, the commerce of

the Tonawandas is, as shown by the commercial statistics for 1910, as follows:

Commercial statistics, Tonawanda Harbor and Niagara River, N. Y., calendar year 1910.

[Season of navigation opened Apr. 12, 1910; closed Dec. 10, 1910.]

VESSELS ENTERED AND CLEARED.

Registered vessels.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Buffalo Creek district:					
Steam	42	100	142	36,921	....
Sail and barges	99	115	214	97,293	....
Niagara district:					
Steam	557	93	650	539,540	....
Sail and barges	397	93	490	401,739	....
Total	1,095	401	1,496	1,075,493	....

No record of unregistered vessels.

Passengers carried on excursion steamers	98,627
Passengers carried on ferry steamers	475,877
Decrease of tonnage, 1910 under 1909	83,814
Amount of revenue collected, year 1910:	
Lake commerce	$95,407.54
Rail commerce	$3,306.76
Value of imports:	
Lake	$1,846,211.49
Rail	$35,254.71
Value of exports: Lake	$9,076.00
Enrolled tonnage, port of North Tonawanda, N. Y. ... gross tons	72,789
Greatest draft of vessels ... feet	15
New lines of transportation established	None.

RECEIPTS BY LAKE AND RIVER.

Articles.	Amount.	Amount in short tons.	Valuation.	Average haul or distance freight was carried.	Rate per ton-mile.
				Miles.	*Mills.*
Cordwood ... cords	5	10	$50	....	....
Iron ore ... long tons	325,099	364,111	1,267,886	890	0.955
Lath ... pieces	6,324,550	1,581	20,555	900	2.222
Lumber ... feet b. m.	303,370,782	530,899	6,067,416	900	1.433
Pig iron ... long tons	4,963	5,559	86,852	745	2.684
Posts, cedar ... pieces	93,895	2,347	46,948	900	1.667
Railroad ties ... do	250	19	375	....	....
Sand ... cubic yards	1,650	2,475	2,063	10	....
Shingles ... pieces	241,000	43	723	900	1.389

Shipments by lake and river	None.
Shipments by Erie Canal:	
Short tons	207,567
Value	$2,739,366
Lumber shipments by Erie Canal (included in above):	
Feet b. m.	81,507,919
Value	$2,445,238
Receipts by Erie Canal:	
Short tons	42,251
Value	$105,628

20. It will be noted that the principal lake and river commerce consists of receipts of iron ore and lumber, no shipments by lake and river, while the principal canal commerce consists of shipments of lumber and pig iron. This lumber and pig iron is loaded on canal boats at the wharves in Tonawanda Harbor, either direct from lake vessels or from the wharves, the canal boats being moved to and from the Erie Canal by small tugs.

21. Additional terminal facilities would not alter the methods of transfer of this extensive shipment by canal; and, as there is no existing traffic by transfer from canal boats to lake vessels, the need of additional terminal facilities therefor is wholly prospective. It is, moreover, quite feasible to effect such canal-to-lake transfer in Tonawanda Harbor.

22. Whether a traffic involving transfer from canal boats or barges to lake vessels will develop is problematical, for the reason that it involves the question as to which would be the most feasible and economical—to tow canal boats up the Niagara River to vessels in Lake Erie at Buffalo, or to navigate, or tow, loaded lake vessels up against the Niagara River current, the Black Rock Ship Canal being utilized in both instances.

23. In view of the fact that the terminal commission's plans provide for extensive terminals at Buffalo and that canal barges must come to Buffalo elevators for their principal return cargoes—viz, grain—it would appear that canal-to-lake transfer traffic is more likely to continue and develop at Buffalo, and in the extensive natural deep-water harbor between Buffalo and Tonawanda, than at Tonawanda.

24. The terminals "that may be established at North Tonawanda" comprise, primarily, 825 linear feet of wharf on the North Tonawanda side of the barge canal and 1,300 feet on the Tonawanda side, along the concrete walls already built; and, secondarily, land reservations 500 feet wide, beginning about 3,000 feet east of the concrete walls and extending thence easterly, or upstream, 11,000 feet on the south side and 8,000 feet on the north side of the canal.

25. "Deep-water connection" with the primary terminal would require a channelway about 6,000 feet long, from Niagara River, with the secondary terminal about 20,000 feet long.

26. The channelway between wharves from Niagara River to the Main-Webster Street Bridge is 160 feet wide. The channelway between the concrete walls, along the proposed primary terminal, is 200 feet wide, the walls being founded on clay bottom 14 feet below barge canal water surface. The channelway eastward or upstream from the primary terminal is 200 to 250 feet wide.

27. The conditions therefore imply that a deep-water (23 feet) channel can not be excavated more than 150 feet wide between wharves and concrete walls as built, or more than 200 feet wide, provided the wharves and concrete walls are reenforced and protected against undermining by deep excavation.

28. Practically all excavation above the Main-Webster Street Bridge would be from barge-canal depth of 12 feet; the material to be excavated varies from hardpan to clay and gravel; the disposal of excavated material would involve difficulty and therefore extra expense; and maintenance would be required indefinitely because of annual flood deposits.

29. These features all indicate that the excavation of the possible deep-water channel not over 200 feet wide could not likely be done at a cost commensurate with the decidedly limited utility for lake vessels of so narrow a waterway.

30. All excavation for deep-water connection would necessarily be dependent upon and follow the reconstruction "with unlimited headroom" of four bridges to reach the primary terminal, and of six

bridges to reach the secondary terminal. This bridge reconstruction, it is assumed, would be done in conformity with the recommendation of the terminal commission and independent of any action on the part of the United States.

31. It is obviously not possible to consider the proposed improvement along definite lines, for the reason that the terminal plans are as yet only tentative and the commercial uses to be made thereof wholly speculative.

32. It is not probable that the barge canal connection with Niagara River (implying the removal of the present canal dam, which will lower the water level 5 feet to barge-canal level and require closing, by a dam, connection with the present Erie Canal from Tonawanda to Buffalo) will be made within the next two or three years; and the reconstruction of bridges, if done, will be in the indefinite future. The conditions that will admit of definite consideration will not therefore be attained for some indefinite time.

33. In view of this fact and the statements hereinbefore made, the locality is regarded as not worthy of improvement by the General Government at the present time.

Very respectfully, your obedient servant,

J. G. WARREN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.
(Through the Division Engineer.)

[First indorsement.]

OFFICE OF DIVISION ENGINEER, LAKES DIVISION,
Detroit, Mich., June 27, 1911.

Respectfully forwarded to the Chief of Engineers United States Army, concurring in the views of the district officer that the locality is regarded as not worthy of improvement by the General Government at the present time.

C. McD. TOWNSEND,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1362.

BENNETT RIVER, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF BENNETT RIVER, N. C., UP TO GATESVILLE AND ABOVE TO THE HEAD OF NAVIGATION.

February 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 6, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 5th instant, together with copies of reports from Lieut. Col. E. E. Winslow, Corps of Engineers, dated October 25 and December 5, 1912, on preliminary examination and estimate of cost of improvement, respectively, of Bennett River, N. C., up to Gatesville and above to the head of navigation, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 5, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination and survey of Bennett River, N. C.

1. There are submitted herewith, for transmission to Congress, reports dated October 25 and December 5, 1912, by Lieut. Col. E.

Eveleth Winslow, Corps of Engineers, on preliminary examination and estimate of cost, respectively, of Bennett River, N. C., up to Gatesville and above to the head of navigation, called for by the river and harbor act approved July 25, 1912.

2. Bennett River, or Bennett Creek, empties in Chowan River, N. C., which is a tributary of Albemarle Sound, an arm of the Atlantic Ocean.

3. The commerce of Bennett River below Gatesville is reported as about 51,000 tons, valued at approximately $585,000, while that above is confined chiefly to the rafting of timber. The district officer is of opinion that no improvement above Gatesville is warranted on account of the large expense involved as compared with probably resulting benefits. He submits an estimate in the sum of $6,000 for improvement of the river below Gatesville by cutting off overhanging trees, removing sunken logs, snags, and other obstructions, cutting off two sharp bends, and dredging out a turning basin. On account of the moderate cost of the improvement, the small estimated cost of maintenance, and the relatively large value of the commerce affected he believes that Bennett River below Gatesville is worthy of improvement to the extent named, contingent upon the donation, without expense to the United States, of all land which it may be necessary to remove in excavating the turning basin and cutting off the two sharp points. The division engineer concurs in the views of the district officer.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith, dated December 23, 1912, concurring with the views of the district officer and division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Bennett River, N. C., up to Gatesville, is deemed advisable by cutting off overhanging trees, removing obstructions, cutting off two sharp bends, and dredging out a turning basin, following in general the methods described in the report of the district officer, and subject to the conditions stipulated by him, at an estimated cost of $6,000 for first construction and $500 triennially for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost of the improvement. The improvement of the stream above Gatesville, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 23, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. As stated in the report on preliminary examination, the act calling for this investigation requires consideration of two sections of Bennett River, (1) up to Gatesville, and (2) above, to the head of navigation. The results of the preliminary examination indicated that it was not advisable to improve the river above Gatesville, and it was so reported, while an estimate of cost was recommended to determine the advisability of improvement up to Gatesville.

2. The district officer presents a plan of improvement involving the cutting of overhanging trees, the removal of logs, snags, and other obstructions, the cutting off of two sharp bends, and dredging out a turning basin, at an estimated cost of $6,000, with a probable charge for maintenance of about $500 every third year. He recommends this improvement contingent upon local interests providing, without expense to the United States, all the land which it may be necessary to remove in excavating the turning basin and cutting off the two sharp points. The division engineer is in accord with the views of the district officer.

3. The Albemarle Steam Navigation Co. runs a boat to Gatesville regularly throughout the year, and this section of river is also used by tugs for rafting. Navigation is interfered with, however, by obstructions, which it is proposed to remove under the plan of improvement outlined above. It is reported that the commerce on the river below Gatesville amounts to about 51,000 tons, valued at approximately $585,000, the greater part of which consists of lumber and logs, leaving, however, about 5,000 tons of miscellaneous freight.

4. While the commerce other than lumber and logs is not large, the first cost of the improvement necessary to facilitate navigation is not unreasonable, and the estimate for subsequent maintenance is quite small. The board believes that the probable resulting benefits to general commerce and navigation are sufficient to justify this improvement, and it therefore reports that it is advisable for the United States to undertake the work outlined above, at an estimated cost of $6,000, and $500 every three years for maintenance, contingent upon all land necessary for the improvement being furnished free of cost to the United States.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF BENNETT RIVER, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Norfolk, Va., October 25, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army,
(Through division engineer, southeast division).
Subject: Preliminary examination of Bennett River, N. C.

1. The river and harbor act, approved July 25, 1912, provides for a preliminary examination of Bennett River, N. C., up to Gatesville, and above to the head of navigation.

2. Bennett River, or Bennett Creek as it is usually called, is a tributary of the Chowan River, which itself is a tributary of Albemarle Sound. The locality is shown on the Beckford and Winton Quadrangles of the Geological Survey, and upon a corner of the reconnoissance map submitted with this report.

3. The course of the river is for practically its entire length through a swampy country and consequently the water is almost entirely free from sediment. The upper part of the basin is occupied by a series of milldams, the last milldam being at a settlement called Merchant Mills, where there are several mills, which, on account of scarcity of water, were not in operation at the time the examination was made.

4. The slope of the stream is so gentle that the dam at Merchant Mills, though less than 10 feet high, converts the valley of the river into a lake several miles long, and on account of this large artificial lake the river below that point is not subject to freshets, and being a tributary of Albemarle Sound, the river is nontidal; consequently the fluctuations of the surface level are due entirely to the effect of winds upon Albemarle Sound, unfavorable winds reducing the level for several days at a time to 2 feet or more below normal level. No questions of flood control or water power are involved in the subject of the improvement.

5. Bennett River can be crossed only at Gatesville, Merchant Mills, and up above the mill pond, and consequently the county roads converge to Gatesville and to Merchant Mills, the only settlements on the river.

6. The part of the river between these settlements is paralleled at a distance of about 6 miles to the northwest by the Atlantic Coast Line Railroad, Gatesville and Merchant Mills being, respectively, about 6 and 7 miles from the nearest railroad stations. To the eastward there is a branch of the Norfolk Southern Railroad, Gatesville and Merchant Mills being 8 and 7 miles, respectively, from the nearest station on this road. No point on this part of the river is more than about 8 miles from a railroad station. The county roads, however, are very bad and hauling over them expensive.

7. Gatesville is located about 12 miles above the mouth of the river and is the largest settlement. It has a population of about 300 inhabitants and is the county seat of the county. At Gatesville there is located the only bridge across the river between Merchant Mills and its mouth. This bridge is a steel highway bridge, having a draw with an opening of 22 feet and a headroom with draw closed of 4 feet. The existence of the bridge and other conditions naturally divide Bennett River into two parts, which will be described and considered separately.

8. For some miles below Gatesville the river is narrow and winding, its width averaging about 75 feet. Its depth, though, averages about 14 feet. Nearer its mouth the river widens out, and just above its junction with the Chowan its width is nearly a quarter of a mile.

9. Steamers belonging to the Albemarle Steam Navigation Co. run regularly between Gatesville and Tunis, the Atlantic Coast Line crossing of the Chowan River, making one round trip per week throughout the entire year. This portion of the river is also used by tugs and for rafting. Navigation is, however, interfered with by overhanging trees in places, by a number of logs and snags, by two sharp bends near Hinton Landing, and by the remains of some obstructions placed during the war at a place known as the "Blockade." There is also need of a turning basin at or near Gatesville, as the river below that town is so narrow that the regular steamer has to back downstream nearly three-fourths of a mile before it is able to turn.

10. From interested parties it is learned that the annual commerce of this stream below Gatesville amounts to about 51,000 tons, valued at approximately $585,000, of which the largest item, probably 90 per cent, consists of lumber and logs. There are no public wharves at Gatesville, but land for them could probably be secured.

11. From the examination it would appear that the cost of making the improvements needed below Gatesville would not be unduly expensive, and that with the proper care in the handling of rafts the improvement once made would cost very little for maintenance. There is in the Norfolk engineering district a snagboat (fitted also with a dredge bucket) engaged usually in operations on the tributaries of Albemarle Sound, and this boat will be available for doing all of the work mentioned on Bennett River should the improvement be authorized. Taking all these matters into consideration, I am of the opinion that Bennett River below Gatesville is worthy of improvement to a moderate extent, and an estimate of the cost of this work can be furnished if desired without a survey, sufficient data being on file in this office.

12. This river above Gatesville has been the subject of one previous examination, made in 1905, in accordance with the provision of the river and harbor act of that year. The report upon the examination was published in House Document No. 179, Fifty-ninth Congress, first session, and was to the effect that this part of the stream was not at that time considered worthy of improvement by the Government.

13. The distance between the dam at Merchant Mills and Gatesville in a direct line is less than 4 miles; by wagon road the distance is nearly 6 miles, and by the meanderings of the stream probably 7 miles. This section of the river flows through a thickly overgrown swamp, and it is only at intervals that the highlands touch or are in sight of the river. The different points of this highland are separated by numerous swampy ravines which in several cases extend for considerable distances from the river, and as the roads paralleling the river avoid these swamps it follows that they are far away from the river.

14. The course of the river throughout the section between Merchant Mills and Gatesville is extremely tortuous, with frequent sharp bends.

15. About a mile below the mill dam, measured by the river, and probably about one-third of this distance by wagon road, there is on the left bank an old landing, known as Mills Landing. The section of the river between the dam and the landing is almost completely overhung with trees. It is nowhere over 20 feet in width, while the depth is from 2 to 6 feet only, and at places the stream is almost completely dammed up by sunken logs or snags. An improvement of this section so as to make the river navigable for steam or power boats is believed to be impracticable.

16. Proceeding downstream from Mills Landing the river is still very crooked, of irregular width, and with frequent sharp bends. The minimum width near Mills Landing is less than 20 feet, and even not far from Gatesville widths of less than 50 feet are found. In a few places near Mills Landing the water is less than 4 feet deep, but further down the river seems to have a minimum depth of 6 or 7 feet. Throughout this section there are a number of overhanging trees and some snags, and before boat navigation will be practicable a number of sharp points would have to be cut off.

17. Almost the only use now made of the river above Gatesville is for the transportation of rafts. Occasionally a small tug will go a few miles above Gatesville, but usually the timber is floated down and turned over to the tugs below the bridge at Gatesville.

18. Practically all of the miscellaneous freight now shipped to and from Gatesville is carried by the steamer of the Albemarle Steam Navigation Co., which is too wide to pass through the draw of the bridge at Gatesville. Consequently, without the widening of this draw, navigation above this bridge would be confined, even on an improved river, to such small boats, probably propelled by gasoline, as could pass through the draw.

19. Freight collected by these steamers would have to be transferred to the larger steamer at Gatesville or else be carried by these small boats the additional distance of about 25 miles to Tunis and there be delivered to the railroad.

20. If the river could be opened as far as Mills Landing it is expected by the persons interested that this would become an important shipping point, and a number of letters [1] arguing to this effect have been received, and are forwarded with this report. It should be noted, however, that there is no point on either side of the river between Gatesville and Mills Landing that is at present more than 8 miles from a railroad station. Furthermore, the commercial conditions are such that the freight hauled by water from Mills Landing is to be turned over, after a water haul of over 30 miles, to a railroad and at a point only a few miles from the nearest station to Mills Landing.

21. Practically nothing is made or consumed immediately at Mills Landing, and a wagon haul would be necessary for practically everything either to or from the landing.

22. At present all farm produce has to be loaded in wagons to be hauled to the railroad station, and to be there unloaded and turned over to the railroad. With the river improved there would still be the loading into wagons and the wagon haul from the farm to the river. There it would have to be unloaded into boats, to be then

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[1] Not printed.

taken by boats to the railroad and to be again handled in turning it over to the railroad. Should there be a transfer at Gatesville from small boats to steamboat an additional handling is involved.

23. Were river navigation possible the only gain would consist in reducing the wagon haul of material already loaded in a wagon by the excess of the distance from the farm to the railroad station over that from the farm to the river. On the other hand, there would be the additional cost of the handling from wagon to boat and the boat transportation.

24. The point where the transfer from the boat to the railroad would probably take place is Tunis, on the Chowan River, from which the rail haul to Norfolk, the probable route of the freight, is a few miles farther than from the railroad stations nearest Mills Landing. Tunis being on a river may possibly have a slight advantage in rail rates, but unless the advantage in rates is larger than is expected and is sufficient to pay the entire cost of the boat haul and the additional cost of handling, which surely is not probable, it is evident that no traffic would come to the improved river at Mills Landing except such as pertains to points nearer to the landing than to the railroad station. In fact, after a canvass of the situation and a study of a map of the roads, the only area which would appear to be commercially tributary to Mills Landing on an improved river would be that within a radius of not exceeding 3 miles from Mills Landing, and the saving to such freight would be only the lessening of the haul of loaded material by a distance from nothing to less than 7 miles and probably averaging less than 3 miles.

25. Mr. Riddick, the general manager of the Merchant Mills Co., has submitted a statement[1] giving an estimate of the amount of commerce which might be tributary to an improved river. His statement reduced to tonnage amounts to only about 3,100 tons annually of general merchandise, farm produce, fertilizer, etc. In addition, he mentions an indefinite amount of timber and lumber, but it should be noted that the river is already available for and is actually used for rafting considerable amounts of timber between Mills Landing and Gatesville.

26. To open the river to Mills Landing would be quite expensive, involving much snagging, clearing of banks and cutting off of sharp points, and would require the construction of a separate snagging plant, since the snag-boat mentioned as available for use below Gatesville is too wide to get through the draw at Gatesville.

27. On account of the considerable cost of this work, the small amount of merchandise which would be affected by the improvement, and the very small benefit which would accrue to such merchandise, the improvement of this river to Mills Landing does not appear to me to be advisable.

28. As has been stated before, the river for the greater portion of the distance between Gatesville and Merchant Mills is bordered by swamp land, a fact indicated on the drawing submitted and shown on the Geological Survey map. Furthermore, this swamp land has a tendency to extend up ravines for a considerable distance from the river, causing the roads paralleling the river to lie from a half mile to 1½ miles from it.

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[1] Not printed.

29. Were the river improved to some intermediate point, say halfway between Gatesville and Mills Landing, it would be of considerable benefit to the small area of farm land lying between that part of the river and the parallel roads, but the benefit would be very slight to the area outside the roads, for there would be but very little saving of distance in hauling on private roads to the new landing over hauling on county roads to Gatesville, as at present.

30. While it would be possible, at comparatively light expense, to carry the improvement a short distance above Gatesville, the benefit resulting from such a short extension would be very slight, and it is believed that the cost of improvement would increase more rapidly per mile than the benefit resulting from it. In fact, the river to the next landing above Gatesville could be used in its present condition, but it is not used except for rafting.

31. For the reasons stated above, the river above Gatesville does not appear to me to be worthy of improvement. I have, however, already stated (par. 11) that the river below Gatesville appears to me to be worthy of improvement to a moderate extent as specified.

E. Eveleth Winslow,
Lieut. Col., Corps of Engineers.

[First indorsement.]

Office of Division Engineer, Southeast Division,
Savannah, Ga., October 29, 1912.

The Chief of Engineers, United States Army:

1. I agree with the district officer that Bennett River, N. C., is worthy of moderate improvement as far up as Gatesville, but that it is not worthy of improvement above this point.

2. The district officer does not state whether he regards a survey as necessary to determine the cost of this work or not, and if he does regard it as necessary, he does not state the amount of money that would be required for the survey. If a survey is necessary, I would recommend that it be made, and that a plan and estimate for improving the river to Gatesville be prepared.

Dan C. Kingman,
Colonel, Corps of Engineers.

[Third indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, November 25, 1912.

The Chief of Engineers, United States Army:

1. The act calling for this examination requires the consideration of two sections of Bennett River, namely, up to Gatesville and above to the head of navigation. The character of the stream and a bridge located at Gatesville with a draw opening of but 22 feet, through which vessels now engaged in traffic on the lower river can not pass, naturally divide the river into these two sections.

2. The upper section is about 7 miles in length and extends to Merchant Mills, the head of possible navigation. This section is

extremely tortuous, and its width at the upper end is stated to be nowhere over 20 feet, and there are widths of less than 50 feet in the lower part of this reach. In places the river is almost completely dammed by sunken logs and snags, and the banks are generally overhung with trees. The only use of the river above Gatesville is for the transportation of rafts.

3. The district officer states that there is no point on the river between Gatesville and Mills Landing that is more than 8 miles from a railroad station; that all produce must be hauled by wagon either to a railroad station, as at present, or to a landing, if the river were improved. In the latter case the shipment would be made by water to a point on Chowan River, where it would be transferred to the railroad, but a few miles from the point of production, so that the advantage of water transportation in this case is questionable. The district officer states that to open the river to Mills Landing would be quite expensive, involving much snagging, clearing of the banks, and cutting off of sharp points, and would necessitate the construction of another snagging plant, as the one now available is too wide to pass through the bridge at Gatesville. For reasons given, he is of the opinion, in which the division engineer concurs, that this river is not worthy of improvement above Gatesville.

4. Interested parties were advised of the unfavorable report of the district officer upon this part of the stream and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. From the facts presented, the board concurs with the district officer and the division engineer in believing that the cost of improving this river between Gatesville and Merchant Mills would be excessive when compared with the commerce that would use the stream and the resulting benefits to the general public. It therefore reports that in its opinion it is not advisable for the United States at this time to undertake the improvement of Bennett River above Gatesville.

6. With reference to the river below Gatesville, it appears that this section offers much better prospects for improvement at a cost commensurate with the benefits to be expected, and the district officer and the division engineer are of opinion that this reach is worthy of improvement to a moderate extent. The board concurs with these officers in recommending that an estimate be prepared to determine the extent and advisability of improving Bennett River, N. C., up to Gatesville.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF BENNETT RIVER, N. C.

War Department,
United States Engineer Office,
Norfolk, Va., December 5, 1912.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer, Southeast Division).
Subject: Estimate of cost of improving Bennett River, N. C., below Gatesville.

1. The following estimate of cost of improving Bennett River, N. C., below Gatesville, is submitted in compliance with instructions contained in department's letter dated December 4, 1912.

2. As stated in my report upon the preliminary examination, navigation in Bennett River, below Gatesville, is interfered with by overhanging trees in various places, by a number of sunken logs and snags, by two exceedingly sharp bends near Hinton Landing, and by some obstructions placed during the Civil War in the locality near the mouth of the river known as the "Blockade." There is also need of a turning basin at or near Gatesville, as the river below that town is so narrow that the regular steamer has to back downstream nearly three-fourths of a mile before it is able to turn.

3. To remedy these conditions by cutting off the overhanging trees, removing the sunken logs, snags, and other obstructions, cutting off the two sharp bends, and dredging out a turning basin is estimated to cost $6,000, the entire amount of which should be made available at one time.

4. When this work is done the improvement will probably be nearly permanent, and it is estimated that the maintenance cost will not exceed $500 about every third year, an average of about $160 a year.

5. On account of the moderate cost of the improvement, of the small estimated cost of maintenance, and the relatively large value of the commerce affected, Bennett River, below Gatesville, is believed to be worthy of improvement to the extent named; but it is recommended that the availability of the appropriation be made contingent upon the town of Gatesville, or other parties, providing, without expense to the United States, all the land which it may be necessary to remove in excavating the turning basin and cutting off the two sharp points.

E. Eveleth Winslow,
Lieut. Col., Corps of Engineers.

[First indorsement.]

Office of Division Engineer, Southeast Division,
December 6, 1912.

The Chief of Engineers:

The above estimate appears to be sufficient and the improvement would seem to be a worthy one.

Dan C. Kingman,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

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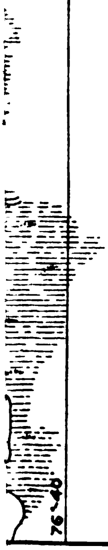
NORFOLK, VA., OCT. 23. 1912.

ACCOMPANY REPORT TO CHIEF OE ENGINEERS
PRELIMINARY EXAMINATION.

E. Eveleth Winslow
LT. COL. CORPS OF ENGINEERS.

36° 20'



MAP OF

BENNETT CREEK,

NORTH CAROLINA.

SCALE OF MILES

1 ½ 0 1 2 3

NOTE:- Traced from U.S. Geological Survey Topographic Map.

W. P. J. 3/13/12

House Doc. No. 1362; 62d Cong., 3d Sess.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1363.

RED RIVER, NEAR FULTON, ARK.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF RED RIVER, AT OR NEAR FULTON, ARK., WITH A VIEW TO THE PREVENTION OF A CUT-OFF.

February 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 6, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 5th instant, together with copy of a report from Maj. J. A. Woodruff, Corps of Engineers, dated November 23, 1912, on preliminary examination of Red River, at or near Fulton, Ark., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 5, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Red River, at or near Fulton, Ark.

1. There is submitted herewith, for transmission to Congress, report dated November 23, 1912, by Maj. J. A. Woodruff, Corps of

Engineers, on preliminary examination of Red River, at or near Fulton, Ark., with a view to the prevention of a cut-off, called for by the river and harbor act approved July 25, 1912.

2. Red River rises in northwest Texas, near the New Mexico boundary line, flows slightly south of east 800 miles to Fulton, Ark., thence southeastward to the Mississippi River for a distance of approximately 575 miles.

3. Inquiry by the district officer failed to develop knowledge of any threatened cut-off at or near Fulton, but it appears that there is a point about 5 miles below Fulton where the river may make a cut-off into Brushy Lake some time in the near future. The district officer states that if the levee should break in front of Brushy Lake a washout will probably result, the extent of which is uncertain, and local interests desire the United States to enlarge their levee on this side of the river to prevent such an occurrence. Inasmuch as the work desired is mainly of value to local interests in preventing the overflow of their lands, and there is no immediate necessity for it in the interests of navigation, the district officer is of opinion that the improvement is not worthy of being undertaken by the General Government. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of December 23, 1912, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports I concur, in general, with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Red River at or near Fulton, Ark., with a view to the prevention of a cut-off, in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

To the Chief of Engineers, United States Army.

1. This is a report on preliminary examination of "Red River at or near Fulton, Ark., with a view to the prevention of a cut-off." Inquiry by the district officer failed to develop any knowledge of a threatened cut-off at or near Fulton. It appears that the locality in question is located some distance below Fulton, where it is feared a break in the levee constructed by the local district might cause the river in whole or in part to enter Brushy Lake, which it approaches quite near, and follow thence through Bois D'Arc Bayou into Red River below.

2. The improvement desired appears to be the enlargement of the levee by the United States to prevent its being breached. The

district officer states that if the levee should break in front of Brushy Lake, a washout will probably result, the extent of which, however, is very uncertain, and, further, that there is no immediate necessity for the work desired by the local authorities as an improvement of navigation. It is mainly of value locally to prevent the overflow of adjacent lands, and in view of these facts he expresses the opinion, in which the division engineer concurs, that this work is not worthy of being undertaken by the General Government.

3. Those in interest were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on the subject have been received.

4. The improvement contemplated in the item of law calling for this investigation appears to have no direct and but little indirect bearing upon the question of navigation. There is very little commerce on the Red River, and it does not seem probable that this would be affected by a cut-off at this point should one occur. The danger of a cut-off does not seem imminent and its probable effect not serious to navigation interests, and therefore the board reports, concurring with the district officer and the division engineer, that it is not advisable for the United States to undertake the improvement of Red River at or near Fulton, Ark., with a view to the prevention of a cut-off.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF RED RIVER NEAR FULTON, ARK.

United States Engineer Office,
Vicksburg, Miss., November 23, 1912.

From: Maj. J. A. Woodruff, Corps of Engineers.
To: The Chief of Engineers United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Red River near Fulton, Ark.

1. The following report is submitted on a preliminary examination of Red River at or near Fulton, Ark., with a view to the prevention of a cut-off, required by section 2 of the river and harbor act of July 25, 1912, and assigned to me by letter from the office of the Chief of Engineers, dated August 3, 1912.

2. The preliminary examination was made by me on September 19, 1912, accompanied by Assistant Engineer H. M. Marshall and the president of the local levee board.

3. Inquiry at Fulton, Ark., failed to develop knowledge of any threatened cut-off at or near Fulton in which anyone had any interest or which would cause any damage to navigation. The accompanying map shows a point about 5 miles below Fulton which will probably make a cut-off at some time in the near future. The map

also shows the near approach of Red River to Brushy Lake, with traces of washouts made when the levee broke there during the flood of 1908. These washouts are being rapidly filled by deposit on the outside of the levee, and the river bank at this point is making. Inquiry developed that this is the matter which caused the order for the examination, and this is confirmed by letters[1] from Mr. J. B. Shultz, president of Hempstead County levee district No. 1, and Hon. W. S. Goodwin, M. C., which are attached hereto.

4. The people on the other side of Red River have only recently formed a levee district and have built a levee higher than that of the Hempstead County levee district No. 1, because the latter had proved insufficient during the flood of 1908. Mr. Shultz states that the resources of his levee district have been exhausted and the land is taxed to the limit; that he fears the next high water will overtop the levee, cause a break and washout from the river into Brushy Lake, and thence into Bois D'Arc Bayou, making the river leave its present course. It is the desire of the levee district that the United States enlarge their levee to the same grade and size as that recently built by the people on the opposite side of the river.

5. If the levee should break in front of Brushy Lake, a washout will probably result, but the extent of the washout is very uncertain. In fact, the backwater around the end of the levee about 5 or 6 miles lower down will come up into Brushy Lake and thereby check the current through any break that may occur.

6. There are no questions of terminal facilities, water-power development, nor other subjects that may be properly connected with this improvement.

7. There is no immediate necessity for the work desired by the local authorities as an improvement of navigation; it is mainly of value to local interests to prevent the overflow of their lands. I am therefore of the opinion that this work is not worthy of being undertaken by the General Government.

J. A. WOODRUFF.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., November 26, 1912.

To Chief of Engineers, concurring in the opinion of the district officer, as stated in paragraph 7, that this work is not worthy of being undertaken by the General Government at this time.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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[1] Not printed.

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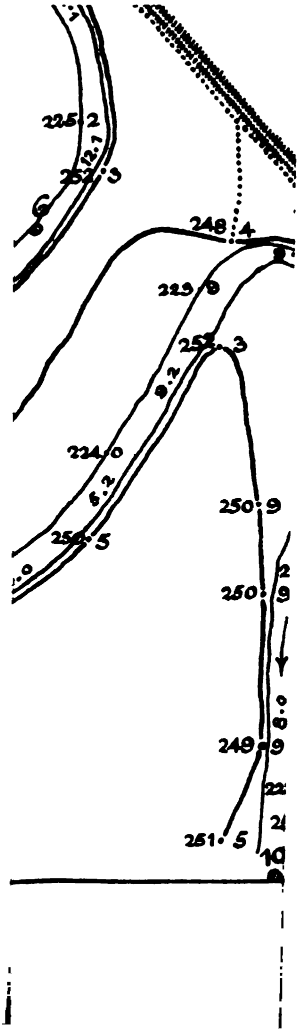
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62d Congress, 3d Session. | HOUSE OF REPRESENTATIVES. | Document No. 1364.

MILLE LACS LAKE AND ONAMIA LAKE, MINN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF MILLE LACS LAKE AND ONAMIA LAKE, MINN., WITH VIEW TO IMPROVING THE NAVIGABILITY OF THE MISSISSIPPI RIVER BY CONSTRUCTING A DAM ACROSS RUM RIVER AT OR NEAR ONAMIA AND THEREBY CREATING A RESERVOIR IN SAID LAKES.

February 7, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, February 6, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 5th instant, together with copy of a report from Lieut. Col. Charles L. Potter, Corps of Engineers, dated November 23, 1912, on preliminary examination of Mille Lacs Lake and Onamia Lake, Minn., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, February 5, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Mille Lacs Lake and Onamia Lake, Minn.

1. There is submitted herewith, for transmission to Congress, report dated November 23, 1912, by Lieut. Col. Charles L. Potter,

Corps of Engineers, on preliminary examination of Mille Lacs Lake and Onamia Lake, Minn., with view to improving the navigability of the Mississippi River by constructing a dam across Rum River at or near Onamia and thereby creating a reservoir in said lakes, called for by the river and harbor act approved July 25, 1912.

2. Mille Lacs Lake has an area of 207 square miles in a watershed of an additional 187 miles. It is drained by the Rum River, which then passes through three smaller lakes, Ogechie, Nessawae, and Onamia, at the lower end of which is the village of Onamia, the proposed dam site. The district officer states that a dam thus located would add about 5 square miles to the 207 miles stated above, as the combined area of the three small lakes. The water storage to be gained by damming Mille Lacs Lake is estimated at 2,357,700,000 cubic feet, while Sandy Lake, the smallest of the 6 reservoirs in operation at the headwaters of the Mississippi, provides over 3,000,000,000 cubic feet, and Winnibigoshish, the largest, provides approximately 44,000,000,000 cubic feet. Mille Lacs Lake is 172 miles from Minneapolis, and nearly all the distance is on a small crooked stream where the flow would be slow. The great surface of the lakes and their outlets, in proportion to their water capacity, must necessarily cause a heavy loss of storage water by evaporation. The district officer states that this lake is not attractive as a reservoir site either from the standpoint of storage or that of availability, and the proposed reservoir would not be of any material benefit to navigation on the Mississippi River. For these reasons, he is of the opinion that the locality is not worthy of improvement by the General Government, and the division engineer concurs in this opinion.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 13, 1913, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Mille Lacs Lake and Onamia Lake, Minn., with a view to improving the navigability of the Mississippi River by constructing a dam across Rum River at or near Onamia and thereby creating a reservoir in said lakes, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 13, 1913.

To the Chief of Engineers, United States Army:

1. The object of this examination is clearly stated by the wording of the act to be "* * * with view to improving the navigability of the Mississippi River by constructing a dam across Rum

River at or near Onamia * * *." This locality is 172 miles above Minneapolis. The lake has an area of about 207 square miles and a watershed, aside from the lake, of 187 square miles. It is drained by Rum River, which empties into the Mississippi River 18 miles above Minneapolis.

2. It appears that this locality has been examined by Prof. Bass, of the University of Minnesota, with a view to utilizing the lake as a source of water supply for the city of Minneapolis. The district officer refers extensively to the data furnished as a result of that investigation, and states that Prof. Bass arrived at the conclusion that while Mille Lacs Lake might furnish the 40,000,000 gallons needed by Minneapolis at that time it could not be counted on to furnish the 50,000,000 gallons which the city would probably need at the end of 10 years. From the figures given by the district officer, it appears that the capacity of the reservoir at Mille Lacs Lake would be 2,357,700,000 cubic feet as compared with over 3,000,000,000 capacity for Sandy Lake, the smallest of the Mississippi River reservoirs, and approximately 43,900,000,000 for Winnibigoshish, the largest of the system. The district officer further states:

> It is stated in paragraph 6 that with the normal rainfall and Prof. Bass's estimate of run-off there should be available in the lake two and three-fourths billions of cubic feet per annum. Later discussion in paragraph 8 leads to the conclusion that this should be cut down to the equivalent of 75 cubic feet per second, or about two and one-third billions of cubic feet. The discussion in paragraph 9 leads to the conclusion that there is grave doubt that even this could be made available for reservoir use without great expense in the way of dredging.

The result of his investigations leads the district officer to the conclusion that the locality is not worthy of improvement by the General Government, and in this view the division engineer concurs.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity to submit their views to the board; no communications on this subject have been received, but on January 6, 1913, Hon. Clarence B. Miller, M. C., appeared before the board with reference to this subject.

4. It appears from available data that Mille Lacs Lake is not an attractive proposition as a reservoir site for the purpose of storing water for the improvement of the navigability of the Mississippi River. The supply of water it would furnish would be so small that it would hardly be appreciable after reaching the Mississippi River or its effect noticeable upon the navigability of that stream.

5. In view of these facts, the board concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the United States to undertake the construction of a dam across Rum River with a view to creating a reservoir in Mille Lacs Lake for improving the navigability of the Mississippi River.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF MILLE LACS LAKE AND ONAMIA LAKE, MINN.

UNITED STATES ENGINEER OFFICE,
St. Paul, Minn., November 23, 1912.

From: District Engineer Officer.
To: The Chief of Engineers, United States Army,
(Through the Division Engineer).
Subject: Preliminary examination of Mille Lacs Lake and Onamia Lake, Minn.

1. The river and harbor act of July 25, 1912, provided for a preliminary examination of:

> Mille Lacs Lake and Onamia Lake, Minn., with a view to improving the navigability of the Mississippi River by constructing a dam across Rum River at or near Onamia, and thereby creating a reservoir in said lakes.

2. Similar report to this was made in 1897 and published in House Document No. 305, Fifty-fourth Congress, second session, the difference being that this report calls for a dam across Rum River at or near Onamia, while the former called for a dam at the outlet. The project was also mentioned in a report made in 1875 on reservoir sites in general and published in Senate Document No. 19 (Part 5), Forty-third Congress, second session.

3. The present examination was made by Junior Engineer E. J. Dugan, assisted by Inspector W. N. Carey, who visited the locality on November 11 and 12, 1912; inspected the proposed location of the dam; and followed up the river by land to the main lake, inspecting the river and small lakes at available points. A meeting was held on the 11th, and the matter gone over with some of the business men of the village of Onamia.

4. Mille Lacs Lake has an area of 207 square miles in a watershed of an additional 187 square miles. It is drained by the Rum River which, after leaving the main lake, passes through three smaller lakes, Ogechie, Nessawae, and Onamia, at the lower end of the last of which is the village of Onamia, the proposed dam site. A dam thus located would add about 5 square miles to the 207 miles stated above, as the combined area of the three small lakes.

5. An exhaustive study of water supply conditions at Mille Lacs Lake was made by Prof. F. H. Bass, of the University of Minnesota, in 1909. This study was made for the city of Minneapolis in connection with the possible use of the lake to supply that city with water. The document is published, with other reports touching water supply for the city, in a volume printed by the Syndicate Printing Co. of Minneapolis in 1910, and presumably for the city of Minneapolis. This report is so full and complete that a great deal of what follows will be taken from data given therein. The added areas of lake and watershed, due to the location of a dam at Onamia, instead of at the lake outlet, are so small that they need scarcely be considered.

6. According to Prof. Bass there is over the entire area of 394 square miles (207 of lake and 187 of land) an average annual rainfall of 27.5 inches. Over the lake area there is an annual evaporation of 34 inches, leaving a deficiency of 6.5 inches in supply to the lake itself, which, over an area of 207 miles, amounts to 1,345.5 mile-inches, or about 3,126,000,000 cubic feet. Prof. Bass, after an examination of the soil and other conditions, arrives at the conclusion that the run-off on the 187 square miles of watershed will be as follows:

124 miles of dry land at 70 per cent	8,680.0
54.5 miles of swamp at 7 per cent	381.5
8.5 miles of water surface at 15 per cent	127.5
	187)9,189.0
	49+

or an average run-off over the entire watershed of more than 49 per cent. There is a doubt whether so high an average can be counted upon, but such being assumed, there will be available a run-off of 13.475 inches (49 per cent of 27.5) over an area of 187 square miles, or 2,519.8 mile-inches—about 5,854,000,000 cubic feet. Therefore the total annual water supply available from the lake is only 2,728,000,000 cubic feet (difference between land excess and lake deficiency), amounting to about 86 cubic feet per second throughout the year.

7. Prof. Bass then takes the record of the rainfall for 29 years from 1881 to 1909, inclusive, and allows for run-off and evaporation over the various areas as already stated. The year 1881 was one of heavy precipitation, and the lake that year would have furnished 40,000,000 gallons per day (61 cubic feet per second) throughout the year, and would have accumulated 20.4 inches more (making the level +20.4 inches) had there been a dam installed at its outlet at the end of the year 1880. With a constant draft of 61 cubic feet per second there would have been a gradual drawing down of the lake level until the year 1895, when the +20.4 inches accumulated in the year 1882 would have been reduced to −49.8. In other words, during a dry period of 14 years succeeding the year 1881, the lake could not have furnished 61 feet per second without having gone down 70.2 inches, or nearly 6 feet. In the succeeding 14 years the lake would have furnished 61 cubic feet per second and would have risen until 1909, when its level would have been +26.2 inches. A draft of 61 cubic feet per second means 4 inches a year over the entire lake, and, at that rate, the draft in 14 years would have been 56 inches. Prof. Bass's calculations show that the draft of 61 cubic feet per second, between the years 1882 and 1895, inclusive, would have actually lowered the lake 70.2 inches. Therefore, for those 14 years, the actual accumulation, had there been no draft, would have been 14.2 inchess less than nothing. In other words, had a dam been built in the winter of 1881 and kept tightly closed for 14 years, the water in 1895 would have been 14.2 inches lower than at the start. Assume that a dam had been erected at the close of the year 1880, and that the lake level at that time was taken as zero, in 29 years, with a draft of 61 cubic feet per second, there would have been an excess of 26.2 inches, or an average of 0.9 inch per year. The lake could have therefore stood a draft of 4.9 inches per year (75 cubic feet per second) and have come out even at the end of the period. The condition of the lake each succeeding year would have been as follows:

1880	0.0	1890	−47.0	1900	−44.2
1881	+19.5	1891	−57.8	1901	−48.2
1882	+10.4	1892	−49.7	1902	−41.8
1883	+ 8.2	1893	−53.7	1903	−24.8
1884	+ 4.2	1894	−57.7	1904	−15.1
1885	− 1.4	1895	−63.3	1905	−10.2
1886	−10.5	1896	−51.8	1906	− 3.8
1887	−14.5	1897	−46.9	1907	−12.9
1888	−18.5	1898	−52.5	1908	− 6.5
1889	−37.9	1899	−54.0	1909	− 0.1

These figures are based on an average run-off of 49 per cent, which is believed to be a high figure. Prof. Bass thus arrived at the conclusion that, while Mille Lacs Lake might furnish the 40,000,000 gallons needed by Minneapolis at that time, it could not be counted on to furnish the 50,000,000 gallons which the city would probably need at the end of 10 years, and his conclusions appear justified.

8. It might at this juncture be stated that a lake which could not furnish sufficient water to supply the city of Minneapolis would be of little benefit toward improving the navigation of the Mississippi River. But there are other features worthy of comment. Prof. Bass states:

> It is evident from the map of the shore line of the lake prepared by the United States Geological Survey that the level of the lake can not be raised without flooding many square miles of territory. This shallow flowage would be very detrimental to the quality of the water, and should not be considered under any circumstances.

The quality of the water does not affect the lake as a reservoir, but the fact that the "many square miles of territory" would, if attempt were made to store above natural lake level, which probably could seldom be done, be changed from land, with a run-off estimated at 70 per cent, or from swamp, with a run-off estimated at 7 per cent, to lake surface, with a run-off estimated at minus 23⅔ per cent (6.5 inches deficiency on the lake), suggests considerable doubt whether, as a storage reservoir, Mille Lacs Lake could even produce the equivalent of 75 cubic feet per second throughout long period of years.

9. There is another particular wherein a reservoir would differ from a lake used as a water supply, and that is the possibility of getting the water out by its natural outlet. A survey made for the purpose of determining levels in a suit for flowage damages is said to have developed the fact that the fall from Mille Lacs Lake, through about 5 miles of river and 7 miles of lakes, to the proposed dam site was only 2 feet. It is not known at what level the lake was at the time, but, assuming it as zero in the table in paragraph 7 (the winter low water of 1880), it will be seen that, having taken out the equivalent of 75 cubic feet per second through each year, the lake level would have been from 1889 to 1903 below the water level at the dam site.

10. It is stated in paragraph 6 that with the normal rainfall and Prof. Bass's estimate of run-off there should be available in the lake 2,750,000,000 cubic feet per annum. Later discussion in paragraph 8 leads to the conclusion that this should be cut down to the equivalent of 75 cubic feet per second, or about 2,333,000,000 cubic feet. The discussion in paragraph 9 leads to the conclusion that there is grave doubt that even this could be made available for reservoir use without great expense in the way of dredging.

11. As the outlet of Mille Lacs Lake (Rum River) empties into the Mississippi River only 18 miles above Minneapolis, this reservoir must be considered in connection with navigation below Minneapolis and in conjunction with the other reservoirs in order to determine its advantages. There are already constructed and in operation six reservoirs on the headwaters of the Mississippi River. They are at varying distances from Minneapolis. Two are on the main river, one is on a tributary of considerable size, and the other three are on

small tributaries. The following table shows their capacities in cubic feet and their distance from Minneapolis, and includes the proposed reservoir at Mille Lacs Lake:

Reservoir.	Capacity.	Distance from Minneapolis.		
		On small stream.	On main stream.	Total.
		Miles.	*Miles.*	*Miles.*
Winnibigoshish	43,992,000,000	....	385	385
Leech Lake	33,094,000,000	....	391	391
Pokegama	5,260,000,000	....	337	337
Sandy Lake	3,157,900,000	1	256	257
Pine River	7,732,900,000	15	172	187
Gull Lake	4,910,100,000	19	138	157
Mille Lacs Lake	2,357,700,000	154	18	172

It will be seen that Mille Lacs could add only 2⅓ billions of cubic feet to an already established storage of more than 98 billions. The heavy work of furnishing water to the Mississippi River always falls on the first three reservoirs in the above table, or those on the main river. The smaller reservoirs have the advantage of being able to get water to Minneapolis more quickly when needed and to keep up the supply until water has had time to get down from the main reservoirs. The existing reservoirs on the smaller tributaries are 157, 187, and 257 miles, respectively, from Minneapolis, and nearly all of the distance in all cases is on the main river, where the flow is more rapid. Mille Lacs Lake is 172 miles from Minneapolis, and nearly all the distance is on a small crooked stream where the flow will be slow. Thus it will be seen that Mille Lacs Lake is not attractive as a reservoir either from the standpoint of storage or that of availability.

12. The proposed reservoir will not be of any material benefit to navigation in the Mississippi River. While electric power is not mentioned in the law, it is believed to be only fair to consider it in connection with the Government's work to develop power at Lock and Dam No. 1 above St. Paul. The dam as designed will provide a head of 30 feet, and it is estimated that the flow of the river will in an average year develop 15,000 horsepower for 275 days. Of course, Mille Lacs Lake will furnish the same amount of water, whether controlled or not, but by controlling it the water could be used during the 90 days when a shortage ordinarily exists. The 2,357,700,000 cubic feet distributed over 90 days would give 300 cubic feet per second, which would amount to about 818 horsepower for 90 days, allowing 80 per cent efficiency of generation. This would scarcely amount to enough in value to pay the cost of care and operation of the present smallest reservoir. Besides, it will be seen from the preceding discussion that this assumed supply is probably large and may be expected to be unreliable. Again, no deduction has been made for loss between Mille Lacs and the dam at Lock No. 1.

13. No water-power question enters the problem at the proposed dam, as the head could not be more than a few feet.

14. It is believed that the locality in question is not worthy of improvement by the General Government.

CHAS. L. POTTER,
Lieut. Col., Corps of Engineers.

[First indorsement.]

Office of the Division Engineer, Western Division,
St. Louis, Mo., December 2, 1912.

To the Chief of Engineers, concurring in the opinion of the district officer, that the construction of a dam across Rum River at or near Onamia, Minn., would not be of sufficient benefit to the navigability of the Mississippi River to justify its construction by the General Government.

C. McD. Townsend,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1369.

PROVIDENCE RIVER AND HARBOR, R. I.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF PRELIMINARY EXAMINATION AND SURVEY OF PROVIDENCE RIVER AND HARBOR, R. I., WITH A VIEW TO DEEPENING THE CHANNEL TO 30 FEET.

FEBRUARY 8, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 8, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copies of reports from Col. Frederic V. Abbot and Col. John Millis, Corps of Engineers, on preliminary examination and survey, respectively, of Providence River and Harbor, R. I., made in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 8, 1913.

From: The Chief of Engineers, U. S. Army.
To: The Secretary of War.
Subject: Examination and survey of Providence River and Harbor, R. I.

1. There are submitted herewith for transmission to Congress reports dated December 19, 1911, and January 31, 1913, with map,

by Col. Frederic V. Abbot, Corps of Engineers, and Col. John Millis, Corps of Engineers, on preliminary examination and survey, respectively, of Providence River and Harbor, R. I., with a view to deepening the channel to 30 feet, called for by the river and harbor act, approved February 27, 1911.

2. The project under which work for the improvement of this harbor is now in progress, with all modifications, provides for dredging all of the harbor between Fox Point and Fields Point, limited on the east and west by the harbor lines, the cutting off of Fields Point back to the western harbor line, and widening the approach channel to a minimum width of 600 feet from Kettle Point to Gaspee Point; also restoring the depths in certain of the older portions of the work that have shoaled since originally dredged. The depth required for all work is 25 feet at mean low water.

3. The district officer states that it is now found that the depth of 25 feet originally contemplated is not sufficient to permit realizing fully the objects that it was intended to attain when the work was projected, and to develop the potential advantages that Providence possesses as a seaport. He expresses the opinion that the deepening of Providence River and Harbor to 30 feet is advisable and worthy of being undertaken by the General Government in cooperation with local interests, and he submits an estimate of the cost of the proposed work in the total sum of $1,096,500, and $25,000 annually for maintenance. The channel widths contemplated are 600 feet above Gaspee Point and 800 feet below this point. Under the plan of cooperation suggested by him the cost of the work to the United States would be $618,500 for original construction, and $12,500 annually for maintenance, and the cost to local interests would be $478,000, and $12,500 annually for maintenance. The division engineer concurs in the recommendation that Providence Harbor is worthy of improvement by the General Government to the extent contemplated, but he believes that cooperation should take the form of requiring local interests to provide a suitable place for deposit of dredged material, and to construct the necessary bulkheads, and pay the cost of necessary rehandling of materials, the land reclaimed to become the property of such interests.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's report herewith dated February 6, 1913. The board concurs with the district officer and the division engineer in general as to the extent of improvement desirable, with the exception of the section below Gaspee Point, where it believes that a width of 600 feet instead of 800 feet will be ample for present and immediately prospective requirements of commerce. The estimate for this lesser width, furnished by the district officer, is $312,800, and the total estimated cost of the improvement as thus modified is $927,800. For reasons fully explained the board is of opinion that the total cost of this improvement and its maintenance should be borne by the United States, and that it would appear advisable to adopt the suggestion of the division engineer with reference to the deposit of dredged material on shallow areas near the city of Providence if plans therefor can be arranged with local interests, whereby the cost of the work to the United States will be reduced, or at least will not be increased.

5. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors as to the worthiness of the work, and with the Board of Engineers for Rivers and Harbors as to the extent of local cooperation, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Providence River and Harbor, R. I., with a view to deepening the channel to 30 feet is deemed advisable so far as to secure an available harbor or channel depth of 30 feet and a channel width of 600 feet increased at entrances and on curves at an estimated cost of $927,800 for first construction and $25,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $300,000 and subsequent appropriations of about $325,000 per year for two years, no work in the harbor proper north of Fields Point to be done until the Secretary of War is satisfied that the State and city shall have completed their proposed expenditures in the combined Providence and Pawtucket harbors up to at least $2,000,000 for public harbor terminals or other permanent public harbor improvements.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third Indorsement.]

Board of Engineers for Rivers and Harbors,
February 6, 1913.

The Chief of Engineers, *United States Army:*

1. The survey of Providence River and Harbor, R. I., with a view to deepening the channel to 30 feet, having been made, the district officer presents herein a plan of improvement which involves dredging from deep water near North Point, Popasquash Neck, up to Fox Point, in the harbor proper, the width of channel to be 600 feet from Providence to Gaspee Point, the lower end of the present dredged channel, and 800 feet below this point, the depth throughout to be 30 feet at mean low water. The estimate for this work is as follows:

From deep water up to Sabine Point Lighthouse	$481,500
From Sabine Point to Fields Point	274,000
From Fields Point to Fox Point	341,000
Total	1,096,500

2. The importance of this harbor is indicated by the table of commercial statistics furnished, which shows that during the year 1911 35,392 vessels of a net tonnage of 6,537,123, carrying 846,383 passengers, and handling 3,888,858 tons of freight, made use of this harbor. It will be noticed that of the vessels mentioned, 36 were in foreign trade.

3. The existing project provides for dredging all of the harbor between Fox Point and Fields Point, between the east and west

harbor lines, the cutting off of Fields Point back to the western harbor line, and widening the approach channel to a minimum width of 600 feet from Kettle Point to Gaspee Point; also restoring the depths in certain of the old portions of the work that have shoaled since originally dredged, the depth throughout all this work being 25 feet at mean low water. The act of 1910, which appropriated $459,000 for the prosecution of the 25-foot project, provided that no part of said sum should be expended until the Secretary of War should have received satisfactory assurances that the city of Providence or other local agencies would expend on the improvement of the harbor front an equal sum. Such assurances have been given and accepted, and the work of the United States is now nearing completion.

4. The district officer reports that the proposed deepening of Providence River and Harbor to 30 feet is advisable and worthy of being undertaken by the General Government, but only upon a basis of cooperation with local and private interests as follows:

The dredging of the deep water harbor proper to 30 feet and its subsequent maintenance to be provided for by local and private interests.

Estimated cost	$341,000
Annual cost of maintenance	10,000

The deepening to 30 feet and any other improvement of that part of the approach channel between Fields Point and Sabine Point Light to be done jointly by the Government and the local and private interests, upon plans to be approved by the United States, the United States to contribute—

For improvement	$137,000
For maintenance annually	2,500

The above sums being one-half of the present estimated cost for these purposes, respectively.

The deepening of that portion of the approach channel from Sabine Point Light to North Point to 30 feet and its maintenance to be done wholly at the expense of the United States.

Estimated cost	$481,500
Annual cost of maintenance	10,000
Total for the United States:	
Improvement	618,500
Maintenance per year	12,500
Total for local interests:	
Improvement	478,000
Maintenance per year	12,500

5. The division engineer concurs in the opinion of the local officer that Providence Harbor is worthy of improvement. He also concurs in the opinion that the work should be done on a basis of cooperation with local and private interests, but he believes that such cooperation should take the form of local interests, providing suitable areas for depositing the dredged material to the south of Fields Point in the present shoal water, protecting such area by suitable bulkheads, and paying for any necessary rehandling of materials.

6. From its study of this subject it appears to the board that the importance of this harbor from a commercial and navigation standpoint is sufficient to justify such additional work as may be necessary to meet the reasonable demands of commerce, and that the probability of its extensive use by foreign as well as deep-draft coastwise vessels is sufficiently encouraging to warrant the adoption

of a depth of 30 feet. Believing that the width of 600 feet proposed for the channel above Gaspee Point would be sufficient also for the channel below, the board secured from the district officer an estimate for such a width, in the sum of $312,800, as compared with his estimate of $481,500 for the 800-foot channel. Adopting this revised estimate reduces the total cost of the improvement proposed to $927,800, the estimate for maintenance being $25,000.

7. In reference to the matter of local cooperation the board believes that the large expenditures now in progress and to be made by the State and city in the matter of providing public terminal facilities, involving a total of over $2,000,000, as stated in the accompanying letter[1] from the State harbor improvement commission, will constitute a sufficient amount of cooperation in so far as the improvement now under consideration is concerned. It would appear advisable to adopt the suggestion of the division engineer with reference to the deposit of dredged material on shallow areas near the city of Providence, in lieu of towing it long distances to the present dumping grounds, if plans therefor can be arranged with local interests whereby the cost of the work to the United States will be reduced or at least will not be increased.

8. After due consideration, therefore, the board reports that in its opinion it is advisable for the United States to undertake the further improvement of Providence Harbor to a depth of 30 feet, to include a channel of approach 600 feet in width and the dredging of the main harbor south of Fox Point, following generally the lines laid down in the project proposed by the district officer, at a total estimated cost of $927,800 and $25,000 annually for maintenance. It recommends an initial appropriation of $300,000, succeeding appropriations to be made with a view to completing the work in three years.

9. In compliance with law the board reports that except as contemplated by the above recommendations there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interest of navigation.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

REPORT ON PRELIMINARY EXAMINATION OF PROVIDENCE RIVER AND HARBOR, R. I.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Newport, R. I., December 19, 1911.

SIR: 1. In accordance with instructions contained in department letter of April 7, 1911, I have the honor to submit the following report upon a preliminary examination of Providence River and Harbor, R. I., with a view to deepening the channel to 30 feet, made in conformity with the river and harbor act approved February 27, 1911:

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[1] Not printed.

2. Conference with interested parties develops the fact that the improvement desired at this time is the creation of a channel from deep water of Narragansett Bay to the city of Providence, R. I., 30 feet deep at mean low tide and of a width sufficient for safe navigation, the width to be greater where the channel passes through broad, open water areas than where its location is clearly defined by the neighboring shores.

3. The cities of Providence and East Providence lie on opposite sides of the Providence River at its extreme upper end, affording an urban water front of great extent and capable of economical development. Providence River is that arm of Narragansett Bay which carries deep water of the Atlantic Ocean farther inland than any other. There is no bar at the entrance to Narragansett Bay itself, and water over 40 feet deep extends inland as far as Hog Island. Continuous depths of over 30 feet exist for about 3 miles more. The channel from Hog Island to Providence is about 14 miles, and the city has an encircling thickly settled, prosperous, manufacturing belt dependent upon it for supplies of all sorts. Its railroad connections are good, the New York, New Haven & Hartford putting it into close connection with all of New England. The Grand Trunk, which has recently secured a terminal there, will give it an immediate outlet toward Canada and the Northwest. It has both water and rail connections direct to New York City and the South. The popular conception is that Providence is an inland town, but in reality it is only 14 miles from that city to broad, sheltered waters over 40 feet deep, forming an integral part of the Atlantic Ocean. New York City is 18 miles from the nearest 40-foot depths at the entrance to Ambrose Channel. A suitable improvement of 14 miles of channel, already 25 feet deep, makes Providence in all senses a seaport.

4. The range of tide is 4.4 feet. No bridges cross the desired channel. In places the existing 25-foot channel is somewhat narrow, but with funds provided by Congress in previous acts, it is now being widened and large anchorage areas of the same depth are being provided in accordance with projects contained in House Document 919, Sixtieth Congress, first session, and 606, Sixty-first Congress, second session. When the work covered by these projects is completed, there will be a continuous 25-foot channel 600 feet wide from deep water in Narragansett Bay to the 332-acre anchorage area in front of the city, north of Fields Point and Kettle Point. Expenditures under projects prior to those contained in documents 919 and 606, cited above, aggregated $1,859,480.35; adding the $643,800 carried by the estimates in those documents, the 25-foot deep channel and anchorage basins in Providence River and Harbor will have cost $2,503,280.35, so far as expenditures by the United States are concerned. To this should be added the sum of $500,000 provided by the issue of bonds by the State of Rhode Island for the purchase and improvement of lands for public docks at Providence, East Providence, and Pawtucket, which is being expended under the direction of the harbor improvement commission. They are at present building a large dock equipped with modern freight handling machinery on the west side of Providence Harbor and connected with the

railway lines of both the New York, New Haven & Hartford Railroad and the Grand Trunk Railroad. Under the authority of the State of Rhode Island the city of Providence has also raised a sum of $300,000 and has contracted for a granite quay wall 2,900 feet in length along the harbor line on the west side of Providence Harbor, so founded and built as to permit dredging along its front to a depth of 30 feet for its entire length. The State of Rhode Island has also contributed the sum of $67,792 to the deepening of the Pawtucket (Seekonk) River, a feeder to Providence Harbor; the lower portion of the Seekonk really forms an extension of the harbor proper.

5. That there is great local interest in Providence Harbor improvement, and that the community is making ready to utilize its water facilities to the utmost, is indicated by the appended papers marked "F" and "G," which outline a costly and carefully studied scheme for the creation of a system of docks and yards to facilitate the interchange of through freight between ships and railroads and of local freight between ships and wagon transportation. At the request of the State Commission having the above matter in charge, I have delayed the submission of this paper until those plans were received in hopes it could be reported that a definite basis of agreement had been reached between the commission and the New York, New Haven & Hartford Railroad Co. Logically such an agreement would have considerable influence on the tenor of a report upon the present need of a deeper channel leading from deep water of Narragansett Bay to such a complete dock and railroad terminal. It is apparent, however, from the papers that further time must elapse before this terminal question reaches a fixed basis; legislation by the State of Rhode Island must be had, and the question of the advisability of approving such radical changes in harbor lines and anchorage areas must receive careful study before approval by the War Department.

6. In a report of a special committee of the Providence Board of Trade dated June 19, 1911 (appended hereto and marked "A"), the following statements are made as to existing conditions:

> The work being done by the Federal Government, the State of Rhode Island, and the city of Providence on the dock and harbor improvements, involving the expenditure of approximately $1,250,000, is all planned, with the full exception of developing European commerce, requiring a 30-foot channel.
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> These improvements are made in recognition of the unusual opportunity for foreign commerce at this port, where there will shortly be two important lines of railroad, one a transcontinental line and the other having beside its own large trackage important connections with the West and South, so that it is not a question of supplying the wants of the 500,000 people in this immediate vicinity but the unusual opportunity of distribution of European products through these important railroad connections with tidewater. At present the Fabre Line is endeavoring to maintain European service with this point, but, on account of the present depth of the channel, 25 feet, can only send its smaller steamships here, while its patronage would fully warrant sending its larger and newer boats to this port if the depth of channel would admit.
>
> At the present time, without facilities for direct importation, goods valued at something like $2,500,000 are annually imported in bond through the Providence customhouse, which amount and much more would came direct to this port if European vessels requiring a channel of 30 feet could make entry here.
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> Narragansett Bay affords a large and safe anchorage ground within 12 miles of the city of Providence for the largest vessels of our Navy. Increasing the depth of the channel 5 feet for 12 miles would bring any of these vessels to our upper harbor.
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> The report of the Providence harbor master for the year ending December 31, 1910, states that 8,800 vessels of various kinds entered the port of Providence. The total cargoes amounted to 2,979,336 tons. Of this amount over 2,000,000 tons consisted of coal and more than 360,000 tons was general merchandise brought here by steamers.

The largest steamers regularly entering this port are those operated by the Merchants & Miners' Transportation Co. The present channel of 25 feet necessitates extreme caution to be exercised by the ship's officers when entering or leaving Providence. These ships are approximately 300 feet in length and the maximum draft is about 23 feet. With the present type of ship the channel facilities afforded must be navigated cautiously, whereas with an increased depth of channel better protection will be given.

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The oil steamer *Texas*, now coming to this port, drawing 29 feet 1 inch, is compelled to discharge part of its cargo at a point in Delaware Bay, in order to reach Providence through the present channel. It leaves Texas with about 7,000,000 gallons of oil, which has to be reduced to 5,000,000 before coming to Providence. The coal barges *Shenandoah* and *A. C. Ropes*, and the schooners *W. L. Douglas* and *Merrill*, now regularly coming to this port with coal, draw 26 to 27 feet and are obliged to wait in the lower bay for flood tide before entering the upper harbor, and occasionally touch bottom in coming up.

7. Complete statistics of the commerce of Providence are given in the appended tables taken from pages 1209 and 1210, Annual Report of the Chief of Engineers for 1911. These figures have been obtained in the most careful manner, from the persons actually owning or operating the floating craft, and more than justify the statements of the harbor master above quoted by the committee of the board of trade. Since the date of the report of that committee the Fabre line of steamships has increased its service, and now has 46 Providence trips scheduled during the year ending October, 1912, being at the rate of one sailing each eight days. The four steamers, *Roma*, *Madonna*, *Germania*, and *Venezia* now enter and leave regularly; their actual draft at New York for a number of voyages is shown in appended table C.[1] I am informed that since that line has been running to Providence, it has frequently been necessary to leave a portion of the cargoes of their steamers on the New York wharves in order to keep the draft from exceeding that which it is now possible to take into Providence.

8. A strong argument for taking at this time steps to obtain reliable data on which to base an estimate of cost of a 30-foot channel is the fact that Providence has promptly utilized every inch of water heretofore provided, and that both the State of Rhode Island and the city of Providence have come forward with appropriations to provide terminal facilities commensurate with the needs of commerce. In view of the uncertainty as to the outcome of the additional new terminal scheme, it would seem that the present is perhaps a little too soon to make a final report on the "worthiness" of the locality to have a 30-foot channel. It is not unreasonable, however, to anticipate that some legislation will be enacted at this winter's session of the Rhode Island Legislature which may clear up that matter, and it is certain that weather conditions will not permit an accurate survey of the lower part of the channel before May, 1912. No survey is needed of the upper part, as surveys in connection with the dredging of the 25-foot project will cover all that area in the most accurate possible manner.

9. In my opinion, cost forms such a large factor in deciding whether the locality is worthy of improvement or not, that a survey must be made before a report can be submitted on that subject; the expenditure of funds for a survey to determine this factor is fully justifiable, but such survey should not be made earlier than next May, both on

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[1] Not printed.

account of weather conditions and because by that time the terminal questions in the upper harbor may have received such definite consideration by the legislature and by the War Department as to indicate what bearing they should have on the final report. The estimated cost of such a survey is $2,000, and it should be charged to the appropriation for examinations, surveys and contingencies of rivers and harbors. I recommend the allotment.

10. No public hearing has been held, as more intelligent questions for general discussion at a hearing can be formulated after the results of the survey are known.

11. Referring to the provisions of sections 3 of the act of June 25, 1910, there are no questions of water power or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

Very respectfully,

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, December 28, 1911.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the recommendations of the district Engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, January 29, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This river and harbor have been under improvement since 1853 under projects adopted from time to time to meet the growing demands of commerce and navigation and the increasing dimensions of vessels trading at this port. A channel depth of 25 feet has been secured from deep water in Narragansett Bay to the city of Providence. The existing projects provide for certain enlargements within the harbor. There has been expended under previous projects $1,859,480.35, and a further expenditure of $643,800 is contemplated under existing projects.

3. The improvement now desired is a channel of suitable width and 30 feet in depth from deep water in Narragansett Bay to the city of Providence. This would require more or less excavation over a distance of 10 to 12 miles. It appears that the State of Rhode Island and the city of Providence have undertaken the construction of extensive dock and terminal facilities to meet the requirements of a first-class port and to be prepared to take full advantage of the additional work now asked of the United States.

4. The commerce of the locality has been increasing steadily, as indicated by the following, abstracted from the records contained in the reports of the Chief of Engineers: 1897, 2,162,975 tons; 1902, 2,379,000 tons; 1906, 3,086,003 tons; 1908, 3,379,574 tons; 1910, 4,107,862 tons, the latter having a value of over $112,000,000. The largest steamers regularly entering this port have a draft of 23 feet; other vessels carrying oil and coal entering occasionally have a draft exceeding 25 feet.

5. The district officer expresses the opinion, in which the division engineer concurs, that the question of advisability in this case is largely dependent upon the cost of the work involved. Agreeing with this conclusion, the board concurs in recommending that a survey and estimate be authorized.

For the board:

W. C. LANGFITT,
Lieut. Col., Corps of Engineers,
Senior Member Present.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 2, 1912.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of Providence River and Harbor, R. I., authorized by the river and harbor act of February 27, 1911.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality, as proposed, be authorized.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *February 3, 1912.*

Approved as recommended by the Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

APPENDIX A.

REPORT OF THE SPECIAL COMMITTEE OF PROVIDENCE BOARD OF TRADE SETTING FORTH THE NECESSITY OF A 30-FOOT CHANNEL FOR PROVIDENCE RIVER AND HARBOR.

The work being done by the Federal Government, the State of Rhode Island, and the city of Providence on the dock and harbor improvements, involving the expenditure of approximately $1,250,000, is all planned, with the full expectation of developing European commerce, requiring a 30-foot channel.

These improvements are made in recognition of the unusual opportunity for foreign commerce at this port, where there will shortly be two important lines of railroad, one a transcontinental line, and the other having beside its own large trackage, important connections with the West and South, so that it is not a question of supplying the wants of the one-half million people in this immediate vicinity, but, the unusual opportunity of distribution of European products through these important railroad connections with tide water. At present, the Fabre Line is endeavoring to maintain European service with this point, but, on account of the present depth of the channel, twenty-five feet, can only send its smaller steamships here, while its patronage would fully warrant sending its larger and newer boats to this port, if the depth of channel would admit.

At the present time, without facilities for direct importation, goods valued at something like $2,500,000 are annually imported in bond through the Providence customhouse, which amount and much more would come direct to this port if European vessels requiring a channel of 30 feet could make entry here.

Narragansett Bay affords a large and safe anchorage ground within 12 miles of the city of Providence for the largest vessels of our navy. Increasing the depth of this channel five feet for 12 miles would bring any of these vessels to our upper harbor.

About 95 per cent of the products of Rhode Island factories are shipped out of the State, and owing to the lack of merchant marine the greater part is shipped by rail. Practically all freight shipped to foreign countries is either forwarded to Boston by rail or to New York by water. All of our manufacturers shipping from New York are obliged to employ a forwarder at that port. The goods are taken from the New York steamers and transferred either by lighters or trucks and then reshipped. This is an added expense and would be eliminated if foreign steamships were able to enter the port of Providence. As all foreign freight from this section passes through Boston or New York, there are no records of the tonnage shipped to foreign ports. The amount, however, is large and the figures furnished by four local concerns present a fair example of the foreign shipments made by Rhode Island manufacturers. During the year 1910, these four concerns forwarded to foreign countries 31,000 tons of manufactured products. According to the figures given by the United States census of 1910 there are 1,944 manufacturing concerns in the State, whose total products was valued at $279,438,000. Add to these the factories located within the adjoining States for whom Providence is the logical shipping point, and the number is doubled.

The large department stores of Providence are importing yearly, upon a constantly increasing scale, merchandise valued at many hundred thousands of dollars. These goods are purchased at places scattered all over Europe and shipped through the ports of Liverpool, Havre, Bremen, Hamburg, Rotterdam, Glasgow, Genoa, etc., by way of New York.

It would be greatly to the advantage of these concerns if their importations could be shipped direct to Providence instead of New York, and thus eliminate the many inconveniences, delays, as well as the additional expense experienced each year through transactions at other ports. Instances similar to the above could be multiplied indefinitely.

For the coastwise trade a 30-foot channel is equally necessary and means an immense aid to navigation of the present tonnage as well as placing the city in a position to command the attention of the shipping world.

The report of the Providence harbor master for the year ending December 31, 1910, states that 8,800 vessels of various kinds entered the port of Providence. The total cargoes amounted to 2,979,336 tons. Of this amount over 2,000,000 tons consisted of coal and more than 360,000 tons was general merchandise brought here by steamers.

The largest steamers regularly entering this port are those operated by the Merchants & Miners' Transportation Co. The present channel of 25 feet necessitates extreme caution to be exercised by the ship's officers when entering or leaving Providence. These ships are approximately 300 feet in length and the maximum draft is about 23 feet. With the present type of ship the channel facilities afforded must be navigated cautiously, whereas with an increased depth of channel better protection will be given.

The tendency for many years past in the construction of ships for coastwise service has been towards increased cargo capacity, and increased draft. The recently built Morgan Line ships, operating between New York, New Orleans, and Galveston, measure 6,878 gross tons. The latest ships of the Mallory Line, operating between New York and Galveston, measure 6,399 gross tons. The latest ships of the Savannah Line, operating between New York and Savannah, Ga., measure 5,425 gross tons. Only a few years past all these lines were operating ships not in excess of 3,000 gross tons. The tendency of all shipping interests being towards larger ships, the channel facilities for handling such craft must be of correspondingly increased depth.

The oil steamer *Texas*, now coming to this port, drawing 29 feet 1 inch, is compelled to discharge part of its cargo at a point in Delaware Bay in order to reach Providence through the present channel. It leaves Texas with about 7,000,000 gallons of oil, which has to be reduced to 5,000,000 before coming to Providence. The coal barges *Shenandoah* and *A. C. Ropes*, and the schooners *W. L. Douglas* and *Merrill*, now regularly coming to this port with coal, draw 26 to 27 feet, and are obliged to wait in the lower bay for flood tide before entering the upper harbor, and occasionally touch bottom in coming up.

The original, most natural, and cheapest method of transportation is by water, and the city having the best harbor and shipping facilities has the most important factor for making it commercially successful. Cheapness of manufacture may enable a city to dispose of its products locally but high transportation rates act as a handicap when selling these same products elsewhere. The upbuilding of Providence as a commercial city depends upon the facilities she has to offer to the shipping interests. To attract these interests a sufficient depth of water is of absolute importance. A 30-foot channel would place us in a position to command the attention of the shipping world, owing to our proximity to many of the most important manufacturing plants in the country; whereas the present depth of water in our harbor is inadequate to accommodate the larger coastwise ships, to say nothing of transatlantic steamers.

Frederick H. Jackson,
George H. Holmes,
Fred. M. Rhodes,
Committee.

RESOLUTIONS OF PROVIDENCE BOARD OF TRADE, ADOPTED JUNE 19, 1911.

Whereas foreign commerce of the United States has reached a point and is advancing at a rate never before equaled in our history, thereby calling for an increase in shipping facilities for the ports of entry throughout the country; and

Whereas nature has richly endowed Narragansett Bay to a degree second to none upon the Atlantic seaboard, with safe approach from the sea and affording most ample facilities as an available rendezvous for our Navy as well as for commercial uses; and

Whereas the railway and steamship interests centering at Providence, because of its special advantages as a distributing point, demand greater depth of water; and

Whereas under present conditions the port of Providence is virtually blockaded for lack of water to admit ships which are waiting to make this a port of entry, and

Whereas a deeper channel than is now contemplated would make it possible to establish at Providence a greatly needed system of dry docks, inasmuch as there is no place between Boston and New York where a disabled vessel can be repaired: Therefore be it

Resolved, That the Providence Board of Trade urge upon Congress the necessity of a 30-foot channel to meet the demands of commercial conditions at the port of Providence.

Appendix D.

LETTER OF THE GOVERNOR OF RHODE ISLAND.

State of Rhode Island and Providence Plantations,
Executive Department,
Providence, June 13, 1911.

Dear Sir: I am in receipt of your letter of the 9th instant inviting me to express my views upon the importance of deepening the channel in the Providence River and in Providence Harbor to 30 feet.

While I am convinced that such an improvement would greatly facilitate passenger and freight transportation between Providence and other ports, both of this and other countries, I feel that his honor, Mayor Henry Fletcher, of Providence, is much more familiar with the facts of this matter than I myself. Mayor Fletcher is a member of the State harbor improvement commission and has studied conditions closely in this connection for two or three years past, and is also thoroughly familiar with certain harbor improvement work in which the city of Providence is at present engaged.

Broadly speaking, the extension of the Grand Trunk Railway system to tide water in Providence can not fail to open up greatly increased navigation possibilities, which probably will involve the entrance of vessels requiring a channel of greater depth than the present depth of 25 feet. It is a matter of recent history that the steamship Madonna of the Fabre Line, which recently sailed from Providence to Marseilles with over 500 passengers from this port, found the 25-foot channel not deep enough at low water and it was forced to wait the rising of the tide before departure.

The State is also expending half a million dollars in the purchase of shore property for the construction of public docks to enable independent water carriers to discharge and receive cargoes without using private wharfing property as is now necessary.

All these things bespeak greater commercial importance for the port of Providence which of themselves, it seems to me, presage the coming of deeper-draft vessels to this harbor.

If I can be of any further assistance, I shall esteem it a favor if you will advise me.

Very truly, yours,

A. J. Pothier, *Governor.*

Col. F. V. Abbot,
Corps of Engineers

Appendix E.

LETTER OF THE MAYOR OF PROVIDENCE, R. I.

City of Providence, Executive Department,
City Hall, July 6, 1911.

Dear Sir: Replying to your favor of recent date relative to the question of a 30-foot channel for the Providence River and Harbor, I have to say that in my opinion the need of a channel of that depth can not be questioned.

In bringing in coal, which is an important factor in a manufacturing center like this, the dealers are handicapped in as much as only vessels of small draft can enter this port, and I am informed by the dealers that if they could have larger vessels come here it would mean a reduction in transportation charges on coal of from 5 to 10 cents per ton.

In the conferences which I have held with the managers of the Fabre Line of steamships, that has now made Providence a port of call, they have advised me that they will be able to bring only their smallest vessels to Providence unless the depth of the channel is increased to 30 feet. During our negotiations in behalf of the State of Rhode Island and the city of Providence with representatives of the Grand Trunk Railway relative to providing shipping facilities at the proposed State and city wharves, the statement has been made repeatedly that in order to bring to this port vessels of modern type the channel should have a minimum low-water depth of 30 feet.

The further the matter is investigated I find that shippers all corroborate these statements, and by reference to a report made by the board of trade at my suggestion, which is already in your hands, you will see that there is a unanimity of sentiment based on actual necessity, as set forth in said report.

Therefore I can not urge too strongly that prompt action be taken, to the end that the Providence River and Harbor may be subjected to such improvements, including the dredging of the channel to a depth of 30 feet, as will enable its natural advantages for the promotion of commerce to be utilized so as to meet the needs and demands of the community and State.

Very respectfully, yours,

Henry Fletcher, *Mayor.*

Col. F. V. Abbot,
Corps of Engineers.

Appendix F.

LETTER OF COMMISSION FOR IMPROVEMENT OF NAVIGATION IN SEEKONK RIVER.

Providence, R. I., *November 20, 1911.*

Dear Sir: The commission for the improvement of navigation in the Seekonk River, appointed by authority of a resolution of the General Assembly of Rhode Island at its January session, A. D. 1909, continued by resolutions of the January sessions of 1910 and 1911, and by the resolution of the latter year directed "to continue its negotiations with the riparian owners on said Seekonk River with a view to developing the best plan for the improvement of navigation and the construction of docks on that part of said river between the tunnel bridge and the Providence River, and with a view to ascertaining what are the best terms upon which said plan may be carried into effect and to report the same with its recommendations thereon to the general assembly at its next January session," beg leave to present a tentative plan for the permanent improvement of conditions at the entrance of said Seekonk River, with a request that the same may be considered by the engineer's office of the War Department, to the end that negotiations may be carried on with the riparian owners and municipalities involved should such general plan of improvement seem likely to be approved by the department, with or without modifications.

The accompanying blue print indicates the plan now presented by the commission, and, roughly speaking, provides for the continuance of the channel, 22 feet in depth, almost direct from the present drawbridge at Washington Bridge, in a southerly and westerly direction to a point in the Providence River below the present Wilkesbarre Pier and the filling of the present basin between the Providence River and India Point and the utilization of the same for a suitable system of docks and slips and a modern through and local freight terminal.

There have been two plans previously suggested looking to the improvement of conditions now existing at the entrance of the Seekonk River, the first, that which came up in the petition of the New York, New Haven & Hartford Railroad for the establishment of a harbor line, and the second, that suggested by this commission in its report made to the general assembly at its January session A. D. 1910.

This commission believes that neither of these plans were a proper permanent remedy for the evil complained of, and after a further consideration of the matter, we have reason to believe that there is a strong probability that an amicable arrangement, along the general line of the proposed plan, may be arrived at, whereby, through the cooperation of the Government with the State, the railroad and the municipalities affected, a substantial and lasting benefit may be derived by all.

The substantial advantages of the plan now proposed may be briefly enumerated, viz:

1. The channel will become practically a straight channel from Washington bridge to its entrance at Providence harbor below Wilkesbarre pier, easily navigable at any and all periods of the tide, and in which vessels may pass and repass without danger.

2. The elimination of the old channel would make it possible to develop the water front between Fox Point and India Point by filling and utilizing the space with modern slips and docks and suitable storage yards for cars as a supporting yard (providing trackage for approximately 3,500 cars as compared with only a few hundred at present), and also providing convenient space for a freight yard for bulk delivery, making possible the development of the port of Providence as a port of foreign commerce.

3. The shifting of the location of the India Point railroad bridge ultimately and naturally will follow, its location being changed to a point just south of and adjoining the present Washington bridge, and its character changed from a swinging drawbridge to one of the bascule type draw, Washington bridge at the same time being changed to one of a similar type, to be operated as an integral part of such proposed new railroad bridge. This will result in the elimination of one of the present bridges which obstruct the river. The present condition of Washington bridge and the increasing traffic over it will undoubtedly require its reconstruction within a comparatively short time.

This change will eliminate almost wholly the necessity of switching cars over and across the draw, and will furnish easy access to the proposed new docks and yards. At the present time some 2,000 cars a week are hauled across India Point bridge and the limited trackage of the present yards makes a large amount of switching necessary upon the India Point bridge, necessarily interfering with navigation through the bridge. Freight from the north now has to cross the main line to Fall River in East Providence, while northbound freight likewise has to be switched back across the same line to and over India Point bridge. There is not at the present time sufficient room for a supporting yard for the cars necessary for the steamers for Philadelphia, Norfolk, Baltimore, and New York, and cars must necessarily be kept at a distance, and the handling of freight done at a large expense.

4. The plan increases the dock frontage of Providence very largely (approximately 18,000 feet under the new plan as compared with 5,000 utilized at present), and is permanent in its nature, making possible the handling of freight from trans-Atlantic steamships, now impossible because of lack of facilities.

5. It makes possible the further development of the channel in the Seekonk River to Pawtucket, now impossible because of the difficulty of vessels of larger draft passing up to and through India Point bridge. With a straight channel, the depth of the channel would be the only restriction upon the size of vessels that could reach that port.

While it is not within the province of this commission to consider the advantages of the proposed 30-foot channel in the Providence River from Conimicut Point to Providence, yet it is believed that the proposed plan of development of terminals has a direct relation to the proposed deeper channel.

Should it be deemed wise by the department, it is suggested that the New York, New Haven & Hartford Railroad, which, through its leased companies, now controls practically all of the riparian properties which would be affected by the proposed improvement, be communicated with, that its views upon the proposition may be determined.

Inclosed please find blue print of the proposed tentative plan marked "Inclosure A."[1] There is also inclosed herewith copy of chapter 731, of the public laws of

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[1] Not forwarded to Chief of Engineers with this report.

Rhode Island, approved May 17, 1911, continuing this commission and the basis of its authority, marked "Inclosure B." [1]

Very respectfully,

WILLIAM C. BLISS,

Secretary of Commission for the Improvement of Navigation in the Seekonk River.

Col. F. V. ABBOT,
Corps of Engineers.

APPENDIX G.

LETTER OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO.

NEW HAVEN, CONN., *December 9, 1911.*

DEAR SIR: I beg to acknowledge yours of November 25, inclosing copy of letter received from the secretary of the commission for the improvement of navigation in the Seekonk River, asking what attitude the New York, New Haven & Hartford Railroad Co. will take toward the recommendation of the commission regarding the straightening of the Seekonk River.

I have obtained a copy of the plan and with our engineering department have given the matter careful consideration.

The proposed plan will require the entire rearrangement of the company's terminals on the east side of Providence Harbor and the giving up of a large amount of the company's land for the purpose of constructing the 400-foot channel. The present value of this land is much more than that of the submerged area included in the development. The plan will practically render useless all of the trackage and wharf frontage now used and enjoyed by the company and will impose upon the company the necessity and expense of the required changes, including the abandonment and removal of the present India Point Bridge, which is now sufficient for the traffic carried over it. The plan also involves the construction of a new bridge adjacent to the so-called "Washington Bridge" and the acquisition of land and the construction of tracks from the westerly end of the new bridge to the freight terminals south of India Street.

The benefit to be received by the company is limited to increased capacity for yards and wharves, which, however, can only be realized after an enormous expense for filling and construction, whereas the greater benefit is to the communities and industries along the Seekonk River north of India Point Bridge. The cities of Pawtucket, Central Falls, and Providence and the town of East Providence would obtain increased use of that river and cheaper towage and freight rates.

It seems to me therefore that the improvement is one which should be undertaken by the Federal Government, the State, and the communities in the first instance, and that the application for the improvement should come from the communities interested rather than from the company. On the other hand, if the Federal Government approves the plan and the communities interested and the State of Rhode Island believe it is for the public interest that the improvement should be made, I think that the attitude of the company should and will be a liberal and cooperative one. The protection and continuance of its freight and passenger operation must of course be provided for while the improvement is going on. There is no disposition on the part of the company to oppose the improvement or to contemplate it with anything excepting a friendly and cooperative spirit, but in view of the enormous cost and inconvenience to the company it would seem proper that the communities interested and the State of Rhode Island should formulate some definite proposition for the company's consideration.

Until the general features of the plan have met with the approval of the War Department and the communities interested, it is impossible to state officially what part of such improvement this company should undertake or to make application for the particular changes in the harbor lines now suggested by the commission.

I would therefore suggest that the War Department appoint a board of engineers to consider the feasibility of the general plan, to hold a public hearing, and to confer with the representatives of the communities and parties interested. Should such general plan be then approved, the State commission would be in a position to enter into negotiations for a definite change in the harbor lines, which when agreed to could be formally presented to the War Department.

Very respectfully,

E. G. BUCKLAND, *Vice President.*

Col. F. V. ABBOT, *Corps of Engineers.*

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[1] Not forwarded to Chief of Engineers with this report.

APPENDIX H.

COMMERCIAL STATISTICS.

[Season of navigation, the entire year.]

Vessel classifications, 1910.

Classes.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	8,479	....	8,479	3,315,011	810,846
Sailing	663	15	678	112,260	1,348
Barges	1,948	....	1,948	2,228,843	....
Unregistered:					
Steamers	13,500	....	13,500	40,500	6,200
Sailing	450	....	450	1,800	....
Total	25,040	15	25,055	5,698,414	818,394

Included with "registered steamers" are 3,315 steamers on regular lines, 3,286 oyster boats, 993 tugs, 600 yachts and other Government steamers, 120 freight and fishing motor vessels, 98 large colliers on regular lines.

Included with "registered sailing" are 65 coal-carrying schooners, 240 sailing yachts.

Included with "unregistered steamers" are 13,500 small motor boats.

Included with "unregistered sailing" are 450 small sailboats.

During 1910 a new line (the Colonial Line) was established between Providence and New York. This line carries both freight and passengers.

APPENDIX I.

Freight traffic.

Articles.	Amount (customary units).	Amount in short tons.	Valuation.
Coal	....	2,825,810	9,355,399.29
Oil ....gallons	57,874,126	203,569	9,166,562.28
Cotton ....bales	188,674	47,169	14,150,175.00
Lumber ....feet	26,768,005	47,188	745,622.20
Shingles	2,225,000	278	8,455.00
Logs	250	62	1,500.00
Brick	4,799,500	9,598	72,946.00
Cement ....tons	474	474	4,330.00
Stone ....do	2,080	2,080	23,332.53
Sand and gravel ....do	35,182	35,183	92,254.00
Other building material [1] ....do	4,262	4,262	42,978.20
Salt ....do	3,466	3,466	26,944.00
Hay and feed ....do	465	465	11,760.00
Grain ....bushels	97,200	2,206	67,750.00
Live stock ....head	694	393	132,640.00
Fertilizer ....tons	5,409	5,409	183,740.00
Other produce [2]	....	115,759	2,630,013.95
Manufactured iron and steel	....	60,939	4,125,353.41
Merchandise [3] ....tons	689,668	689,668	68,814,800.00
Miscellaneous [4] ....do	53,885	53,885	2,884,143.66
Total	....	4,107,862	112,540,699.52
Increase over 1909	....	292,880	....

[1] Included with "Other building material" are 1,954,200 laths, 1,920 tons of plaster, 825 tons of lime.

[2] Included with "Other produce" are 19,348 barrels of fish, 2,648,400 bushels of oysters and shells, 6,500 cases of eggs.

[3] Included with "Merchandise" are 689,668 tons of freight not classified on regular steamer lines and sailing vessels.

[4] Included with "Miscellaneous" are 1,724,555 gallons of ammonia liquor, 30,000 tons of chemicals, 5,930 tons of boneblack, 6,420 tons of copper bar, 527 tons of logwood, 20,762 empty oil barrels.

The figures include 514,776 tons to and from Pawtucket River passing through Providence Harbor.

REPORT ON SURVEY OF PROVIDENCE RIVER AND HARBOR, R. I.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., January 31, 1913.

From: District Engineer officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Report of survey of Providence River and Harbor, R. I.

1. This survey was authorized by letter from the Chief of Engineers of February 6, 1912, under a provision in the river and harbor act of February 27, 1911, for examination and survey of Providence River and Harbor, R. I., with a view to deepening the channel to 30 feet. The report of preliminary examination was made by Col. Frederic V. Abbot, Corps of Engineers, then in temporary charge of the district, under date of December 19, 1911.

2. The law has been interpreted as contemplating a survey covering the approach channel from deep water in Narragansett Bay to the harbor, and the harbor itself up to Fox Point, or essentially all the area covered by the existing project for dredging by the Federal Government to 25 feet depth, excepting the area at the mouth of the Seekonk River, where a portion of the Green Jacket Shoal has been dredged to 25 feet depth, and with such extension of the approach channel as a 30-foot depth calls for. The survey was made during September, October, and November, 1912, by a party under charge of Mr. George W. Hayden, surveyor, using Government schooner *Gazelle,* on which the party lived while the work was in progress. Soundings were made to cover the portions of the proposed channel where sufficient data were not already available, and borings were made to test the nature of the material that would have to be excavated to obtain the proposed depth and width of channel.

3. The general results of the survey and the location of the proposed channel are shown on the map herewith. Detailed sheets have also been prepared on a larger scale to show all the soundings and for use in preparing the estimates.

4. The material to be excavated will be the usual mixture of mud, sand, and gravel generally found in Narragansett Bay, with some bowlders. The work could be done by the ordinary types of dredging plant now working in this vicinity.

5. The proposed channel has been so laid out as best to utilize the present channel depths without undue variations from straight courses and to keep the amount of excavation at a minimum. A channel 600 feet wide from Providence to Gaspee Point, the lower end of the present dredged channel, and 800 feet wide below this point, is proposed, in the belief that this will be ample for all probable requirements of navigation.

6. The estimates are as follows for the respective sections designated.

From deep water abreast of North Point on Popasquash Neck opposite Bristol to Sabine Point Lighthouse:	
4,814,653 cubic yards of mud, at 10 cents per cubic yard	$481,465.30
In round figures	481,500.00
From Sabine Point Lighthouse to Fields Point:	
1,661,531 cubic yards of mud, at 10 cents per cubic yard	166,153.10
449,046 cubic yards sand, gravel, etc., at 24 cents per cubic yard	107,771.04
	273,924.14
In round figures	274,000.00

The above two sections comprise what may be called the present approach channel to Providence Harbor.

Total for these two sections	$755,500.00

From Fields Point to Fox Point:

2,605,787 cubic yards of mud, at 10 cents per cubic yard	260,578.70
334,201 cubic yards of sand, gravel, etc., at 24 cents per cubic yard	80,208.24
	340,786.94
In round figures	341,000.00

This is virtually Providence Harbor proper, not including the areas now having 25 feet depth over former Green Jacket Shoal or the area with less depth extending north from Fox Point to the fixed bridge at Crawford Street.

SUMMARY.

From deep water up to Sabine Point Lighthouse	$481,500
From Sabine Point to Fields Point	274,000
From Fields Point to Fox Point	341,000
Grand total	1,096,500

The same unit figures have been used above for all parts of the proposed channel. The lower portions will be at a disadvantage on account of greater exposure, but the length of tow to the dumping grounds will be less. In the upper portions, while more distant from the dumping grounds, there may be some advantages in opportunities to dispose of dredged material locally.

7. The latest commercial statistics for Providence Harbor available are those for the calendar year 1911. These were compiled from data obtained by personal visits to all shippers and wharf owners in Providence Harbor and are as follows:

Vessels entering and leaving Providence Harbor, 1911.

[Each entrance and departure together is counted as one.]

Classes.	American.	Foreign.	Total.	Net registered tonnage.	Passengers.
Registered:					
Steamers	12,557	25	12,582	4,078,083	831,933
Sailing	751	11	762	173,730	2,2[illegible]
Barges	2,008	....	2,008	2,177,400	....
Unregistered:					
Steamers	18,450	....	18,450	73,800	10,520
Sailing	840	....	840	3,360	1,6[illegible]
Barges	750	....	750	30,750	....
	35,356	36	35,392	6,537,123	84[illegible]

Included with "registered steamers" are 3,150 steamers on regular lines, 5,325 oyster boats, 782 tugs, 425 steam yachts, 175 Government steamers, 101 colliers on regular lines, 25 foreign trans-Atlantic steamships, 2,400 large pleasure and freight motor vessels.

Included with "registered sailing" are 49 large coal-carrying schooners, 300 yachts, 413 freight schooners.

Included with "unregistered steamers" are 18,450 small motor boats.

Included with "unregistered sailing" are 840 small sailboats.

Included with "unregistered barges" are 750 small coal scows, lighters, pile drivers, oyster scows, etc.

During 1911 the Fabre Line of steamships, sailing between New York and the Azores, France, and Italy, began calling at Providence. This line at present carries only passengers, but it is expected that it will soon carry both freight and passengers from Providence.

Freight traffic for calendar year 1911.

Articles.	Amount in customary unit.	Amount in short tons.	Valuation.
Coal		2,713,137	$10,154,832.55
Oil .... gallons	54,004,257	178,624	7,473,733.72
Cotton .... bales	114,161	28,540	6,849,660.00
Lumber .... feet	16,142,066	29,229	406,210.06
Shingles	4,254,000	531	13,889.00
Logs	2,815	705	14,395.00
Brick	3,890,600	8,108	40,463.95
Stone .... tons	6,153	6,153	115,560.00
Sand and gravel [1] .... do	22,833	22,833	68,499.00
Other building material .... do	4,187	4,187	32,302.00
Salt .... do	4,420	4,420	25,339.00
Hay and feed .... do	468	468	11,232.00
Grain .... bushels	151,000	3,227	105,700.00
Live stock .... head	908	497	187,685.00
Fertiliser .... tons	477	477	14,310.00
Other produce [2] .... do	93,949	93,949	1,733,853.85
Manufactured iron and steel [3] .... do	25,541	25,541	938,726.00
Merchandise [4] .... do	735,781	735,781	73,230,600.00
Miscellaneous [5] .... do	31,451	31,451	1,896,729.50
Total		3,887,858	103,313,720.63
Decrease under 1910		220,004	

[1] Included with "Other building material" are 2,531,300 laths, 2,020 tons plaster, 260 tons lime.

[2] Included with "Other produce" are 11,965 barrels of fish, 2,828,606 bushels of oysters and shells, 6,250 cases of eggs.

[3] Included with "Manufactured iron and steel" are 8,347 tons of pig iron, 9,913 tons of iron wire, 6,126 tons of iron pipe, 1,155 tons of scrap iron.

[4] Included with "Merchandise" are 735,781 tons of freight not classified, carried on regular steamer lines and sailing vessels.

[5] Included with "Miscellaneous" are 4,600 tons of copper, 21,393 empty barrels, 3,353 tons of bone black, 2,920 tons of coal tar, 16,000 tons of chemicals, 1,521 tons of logwood.

The above figures include 508,625 tons to and from Pawtucket River, 30,022 tons to and from foreign ports, passing through Providence Harbor.

8. Providence Harbor proper, which comprises the navigable area north of Fields Point, can be regarded as divided into two portions. The narrow and tapering area north of Fox Point has a central depth of about 20 feet, with depths at the wharves and in the slips generally somewhat less. It is used only by the smaller class of local and coastwise boats, including those running to New York, except that the Fabre Line boats are landing temporarily on the west side of Fox Point wharf, where a berth has been dredged for them by the city. No work of improvement has been done in this area by the Federal Government, and for the boats that use it, excepting those of the Fabre Line, the present approach channel has ample capacity in depth and width. Ocean-going vessels use the deep-water area at the mouth of the Seekonk River between Fox Point and India Point and the area of the harbor between Fox Point and Fields Point. Practically all of this has been dredged to 25 feet depth by the United States. This will be referred to as the deep-water harbor.

9. The project under which work for the improvement of this harbor is now in progress, with all modifications, provides for dredging all of the harbor between Fox Point and Fields Point between the east and west harbor lines, the cutting off of Fields Point back to the western harbor line, and widening the approach channel to a minimum width of 600 feet from Kettle Point to Gaspee Point; also restoring the depths in certain of the older portions of the work that have shoaled since originally dredged. The depth required

for all work is 25 feet at mean low water. The law provided that no port of the $459,000 appropriated by the Government for this work in the river and harbor act of June 25, 1910, should be expended until the Secretary of War should have received satisfactory assurances that the city of Providence or other local agency would expend on the improvement of the harbor front an equal sum. Such assurances were given and accepted as satisfactory, and the part of the work undertaken by the Government is now nearing completion.

10. The work undertaken by the city and State in connection with improving the harbor under the present cooperative plan outlined in Lieut. Col. Sanford's report, printed in House Document No. 606, Sixty-first Congress, second session, was, in brief, acquiring two pieces of property on the west side of the harbor, having a frontage on the harbor line of 700 feet and 1,750 feet, since extended to about 2,900 feet, respectively, and building on the first a pier extending to the harbor line and fitted with appliances for handling freight, with a slip dredged to 25 feet depth alongside of it, and on the second a quay wall along the front at the harbor line, both properties to have railroad connections. The area behind the quay wall is to be filled and vessels are to make fast alongside the wall to receive and discharge freight. The wall is about 50 per cent completed, and of the pier and slip adjacent about 70 per cent has been done. The quay wall has been carried to a depth which will permit deepening the harbor alongside of it to 30 feet, and its length has been increased some 74 per cent over that originally contemplated, but otherwise no additional harbor work or development, contingent especially on the 30-foot channel, is now in contemplation by the local interests. The proposed connection between the Grand Trunk Kailway system and Providence Harbor, referred to in the preliminary report, was undertaken and a large amount of construction work was done on the connecting link of road between Providence, R. I., and Palmer, Mass. This work was, however, suspended last November, and nothing has been done on it since. No definite action has yet been taken relative to the proposed readjustment of harbor lines at the mouth of the Seekonk River on the east side of the harbor, and construction of terminal yards and wharves by the New York, New Haven & Hartford Railroad Co. in that locality. I am informed, however, that the city and State are continuing and will continue the work of harbor development undertaken by them, regardless of cessation of work on the Grand Trunk connection.

11. The following information under the special subjects which the river and harbor act of July 25, 1912, requires shall be covered in reports on proposed works of improvement has been procured in addition to the data given in the preliminary report: Providence Harbor below Fox Point and India Point, the deep water harbor, has a water frontage of about 4½ miles. North of Fox Point there is an arm of the harbor extending about 1 mile to a fixed bridge at Crawford Street in Providence. This arm is about 750 feet wide at its southern end and about 175 feet wide at its northern end. It has never been improved by the United States, but the city of Providence maintains a depth of about 20 feet in it. Forty-five of the 68 wharves bordering on Providence Harbor are located on this arm, and 23 reach the deep water harbor in which, and in the approach thereto from the sea, the United States has done a large amount of

work. Of the 23 wharves on the deep water harbor, 6 are open to the use of all upon terms of agreement with the owners. The general efficiency of these wharves, based upon the purposes for which they are used and the available appliances, is estimated as follows: Four excellent, 8 good, 8 fair, 2 poor, in addition to which 1, the State wharf, is planned to have excellent appliances. In addition to the 23 wharves on the deep-water harbor, the city of Providence is building a quay wall about 2,900 feet long, as above noted, which has a depth of 25 feet of water alongside and which will form part of an important addition to the terminal facilities. It is the plan to have railroad tracks on the area to be filled behind the wall. Sixteen of the 23 wharves have railroad connections and 7 do not. Improved and adequate highways connect with 11 of them.

12. The question of the advisability of the proposed improvement and its worthiness to be undertaken by the General Government, upon which the reporting officer is required to give his opinion, presents the difficulties so frequently encountered in similar cases, since this depends so largely on broad questions of national policy which it is not within the province of the reporting officer to discuss. The only course is to make certain assumptions, state what they are, and give an opinion accordingly.

13. The following is a statement of the channel depths from the sea to the wharves at mean low water that were actually available June 30, 1912, for the principal harbors of the United States on the Atlantic coast, as shown by the last annual report of the Chief of Engineers. In several cases increased depths have already been provided for or are in contemplation. At each of these ports the depths have been secured by or with the assistance of appropriations from the Federal Treasury, more or less extensive in amount.

Harbor:	Feet.	Harbor:	Feet.
Portland, Me	30	Norfolk, Va	30
Boston, Mass	35	Baltimore, Md	35
New Bedford, Mass	25	Savannah, Ga	26
Fall River, Mass	25	Charleston, S. C	28
Providence, R. I	25	Jacksonville, Fla	21
New London, Conn	23	Wilmington, N. C	26
New York, N. Y	40	Brunswick, Ga	23
Philadelphia, Pa	30		

14. It appears that the United States entered upon a project for the development of this harbor and the channel leading to it in cooperation with the local interests, to adapt it for a coastwise commerce with some of the larger ports of the eastern United States seaboard and with at least reasonable expectations of developing a certain amount of trans-Atlantic commerce. The Government has practically completed its share of the work under this project and that actually undertaken by the city and State which involves an outlay in excess of that named in the act of June 25, 1910, is well advanced with good prospects of early completion. The expectation of largely extended rail connection with the harbor, which was an important consideration when the Government joined in the cooperative work of development, has not yet been realized; but it is maintained by those locally interested in the harbor that there is every reason to expect that it will be eventually, and it is stated that the present suspension of operations on the new rail connections does not affect the prosecution of the State and city harbor work.

15. It is now found that the depth of 25 feet originally contemplated is not sufficient to permit realizing fully the objects that it was intended to attain when the work was projected and to develop the potential advantages that Providence possesses as a seaport on account of its strategic location on the coast line and its geographic relations to the railroad transportation systems of the country. This claim appears to be supported by the channel depths that the Government has found it proper to provide at other ports on the coast that do an oversea business and that also do or are expected to do a shipping business with Providence. An increased depth for the approach channel and for the deep-water part of the harbor is therefore asked for; but additional expenditures on the part of local interests, in cooperation with the Government, to secure increased depth—except for the depth of foundations provided at the sea wall—have not been suggested, and it must be added that only a comparatively limited utilization of the total available front of the deep-water harbor, which has already been provided by the Government, has yet been undertaken by local or private interests.

16. The present authorized dumping ground for material excavated in connection with harbor and channel improvements in Narragansett Bay is in the deep area east of Prudence Island and north of Dyers Island. The limit of the extent to which this area can be used for this purpose without detriment to navigation may some time be reached, and the State authorities have already attempted to terminate dumping here on account of the effect on the oyster beds. Further extensive dredging in Providence River and Harbor will very likely involve the question of the economical disposal of the dredged material elsewhere and render it advantageous to consider disposing of it locally. Further development of Providence Harbor proper, or the area north of Fields Point, should be coordinated with improvements of the harbor front out to the harbor line, which will require, or for which can be utilized, material excavated from the harbor for filling. This consideration, as well as the policy recommended by the special board, appointed under the river and harbor act of March 3, 1909, to formulate uniform rules, etc., for cooperation between the Government and local interests in making harbor improvements, indicates that further deepening of the harbor proper should be left to the local interests and to the city and State authorities, though the Government might properly maintain the improvements in this locality that it has already made until the further deepening may be undertaken.

17. For the portion of the approach channel between Fields Point and Sabine Point Light there should also be coordination between the operations of excavating a deeper channel and those of local filling for the reclamation of areas now covered by shoal water and the ultimate development of terminal and harbor facilities and possibly sites for manufacturing establishments in this vicinity. This will probably include some change in the alignment of the channel. The Federal Government might properly assume one-half the estimated cost of developing the present channel to 30 feet and one-half the cost of its maintenance, the particular applications of these amounts to be dependent on any modified location of the channel that might be adopted with the approval of the Federal authorities.

18. It will be proper for the Government to assume the entire expense of excavating and maintaining the deep channel from Sabine Point Light to North Point, if the whole plan is to be adopted on a basis of cooperation as outlined above.

19. In brief, it does not appear to me warrantable for the Government to assume the entire cost of deepening the harbor and channel to 30 feet, after practical completion of its part of the work of improvement under the plan for a depth of 25 feet, which was undertaken on a basis of cooperation with local interests. In this connection the previous expenditures by the Government, as well as the increased total amount of improvement work undertaken by the city and State, are also taken into consideration. Assuming, however, that the plan adopted at first has now turned out to be inadequate to effect the objects intended, and that increasing the depth to 30 feet will accomplish those objects, and also assuming that the Government is in a measure committed to a policy of assisting to carry the work to a satisfactory conclusion, it will be consistent for the United States to continue the assistance to this end. The plans for extending the additional assistance should, however, be made dependent upon the performance by the local interests of their share, at the proper time, and there should be such coordination as may be necessary to reasonably adapt the progress of the entire work to commercial needs and commercial development and utilization of the improvements as they are made. The processes by which local funds for the purpose have to be raised will be a sufficient check on unnecessary work and expenditures, and if the Government work is made to a certain extent dependent on that done at local expense, an automatic check on the whole is afforded.

20. In view of the foregoing and as required by the instructions, I report that the proposed deepening of Providence River and Harbor to 30 feet is in my opinion advisable and worthy of being undertaken by the General Government, but only upon a basis of cooperation with local and private interests as follows: The dredging of the deep water harbor proper to 30 feet and its subsequent maintenance to be provided for by local and private interests.

Estimated cost	$341,000
Annual cost of maintenance	10,000

The deepening to 30 feet and any other improvement of that part of the approach channel between Fields Point and Sabine Point Light to be done jointly by the Government and the local and private interests, upon plans to be approved by the United States, the United States to contribute:

For improvement	$137,000
For maintenance annually	2,500

The above sums being one-half of the present estimated cost for these purposes, respectively.

The deepening of that portion of the approach channel from Sabine Point Light to North Point to 30 feet and its maintenance to be done wholly at the expense of the United States.

Estimated cost	$481,500
Annual cost of maintenance	10,000
Total for the United States:	
Improvement	618,500
Maintenance per year	12,500
Total for local interests:	
Improvement	478,000
Maintenance per year	12,500

21. The rate at which appropriations should be made would depend largely, under the above plan, on the progress made with the private work. An initial appropriation of $250,000 is suggested, with subsequent appropriations to permit finishing the work in three years. Naturally the work would be so planned as to secure first a practicable channel through to the wharves in Providence Harbor by the time the increased depth in the harbor is available, the channel to be widened subsequently to the full width contemplated.

JOHN MILLIS,
Colonel, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, February 3, 1913.

The CHIEF OF ENGINEERS, United States Army:

1. Col. Millis' recommendations that Providence Harbor is worthy of improvement by the General Government, is concurred in. I also concur in the opinoin that the work should be done on a basis of cooperation with local and private interests, but not in the method of cooperation proposed by him. It is known that owing to local conditions the method of disposing of dredged material by dumping in deep water of Narragansett Bay should be discontinued. There is a large shoal area to the south of Fields Point now useless for navigation purposes, and which would be valuable for sites for manufacturing and commercial houses if it were reclaimed. It is believed that the dredged material should be deposited on this or other similar areas and secured in such a manner that it will not return to the channel. This would require a certain outlay for bulkheads and a possible further outlay for the rehandling of materials. On the other hand, the land when reclaimed will have a market value. I would propose that the local interests should be required to provide such a suitable place for the deposit of the dredged material and should undertake to make the necessary bulkheads, and pay the cost of necessary rehandling of materials, the land reclaimed to become the property of such interests.

W. H. BLACK,
Colonel, Corps of Engineers.

[For report of Board of Engineers for Rivers and Harbors on survey, see p. 3.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1370.

WESSAWESKEAG RIVER, ME.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF WESSAWESKEAG RIVER, SOUTH THOMASTON, ME.

February 8, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 7, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. W. E. Craighill, Corps of Engineers, dated November 30, 1912, on preliminary examination of Wessaweskeag River, South Thomaston, Me., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 6, 1913.

From: The Chief of Engineers United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Wessaweskeag River, South Thomaston, Me.

1. There is submitted herewith, for transmission to Congress, report dated November 30, 1912, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary examination of Wessaweskeag River, South

Thomaston, Me., called for by the river and harbor act approved July 25, 1912.

2. Wessaweskeag River is a tidal estuary or basin on the west side of the mouth of Penobscot Bay. It is about 2½ miles long from the mouth to the head of navigation at the village of South Thomaston. This village is about 4 miles south of the city of Rockland and about the same distance southeast of Thomaston, and interested persons claim that it was once the center of commercial activity for the surrounding country. Vessels drawing about 10 feet can come from the ocean to the mouth of the river. The improvement desired is the deepening of the channel, so as to give a depth of at least 6 feet at mean low tide from the mouth of the river up to South Thomaston. The principal source of industry consists in large deposits of granite, there being several quarries near the river, but it seems that there is very little business done, though with existing depths of channel and existing average tides of about 10 feet, vessels drawing about 12 feet should be able to reach the wharves at high tide.

3. In view of the absence of any important business on the river, notwithstanding the present possibilities of its being utilized to a considerable degree, of the fact that any useful improvement could not be accomplished save at some considerable cost, and the improbability of such improvement producing a revival of business, the district officer expresses the opinion that Wessaweskeag River at South Thomaston is not worthy of improvement by the General Government. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring in the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Wessaweskeag River, South Thomaston, Me., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 14, 1913.

To the Chief of Engineers, United States Army.

1. The village of South Thomaston, about 4 miles from Rockland, Me., is located at the head of navigation on the Wessaweskeag River, a tidal estuary about 2½ miles in length. At a narrow point in the stream there is a dam and a tidal mill, now idle, which derives power from the filling and emptying of the basin above. The mean tidal range is 9.6 feet.

2. No work has ever been done at this locality by the General Government. The available depth is about 3½ feet at Haydens Point, about 3,400 feet below the village, with a somewhat greater depth above until a point near the dam is reached, where it is but 2 feet. The principal source of industry consists in large deposits of granite, there being several quarries near the river, but it seems that there is very little business done at present, and the district officer states that advantage is not taken of existing water facilities.

3. The improvement desired is a channel at least 6 feet deep at mean low water up to South Thomaston. It is represented that at one time South Thomaston was the center of a considerable commercial activity, and it is thought that this might be revived through an adequate improvement of the river. It seems that the importance of this locality has declined, while Rockland, 4 miles distant, with excellent water facilities, has advanced, probably due to the better location.

4. The district officer states that no useful improvement could be accomplished except at some considerable cost, and he concludes with the opinion, in which the division engineer concurs, that Wessaweskeag River is not worthy of improvement by the General Government.

5. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, and one communication[1] forwarded by the district officer has been given consideration.

6. From the facts presented it appears that South Thomaston has very little commerce or business activity at the present time; that practically no use is made of existing facilities, which would permit boats and barges of 10 to 12 feet draft to navigate the river at high tide; and that improvement is desired largely in the hope that a revival of business prosperity would result. There is at present practically no commerce, and in the opinion of the board the prospect of any considerable development as a result of improvement is too remote to justify the necessary expenditure. It reports, concurring with the district officer and the division engineer, that it is not advisable for the General Government to undertake the improvement of Wessaweskeag River, Me.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

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[1] Not printed.

PRELIMINARY EXAMINATION OF WESSAWESKEAG RIVER, SOUTH THOMASTON, ME.

United States Engineer Office,
Portland, Me., November 30, 1912.

From: Lieut. Col. W. E. Craighill, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Wessaweskeag River, South Thomaston, Me.

1. The following is a report of a preliminary examination of Wessaweskeag River, South Thomaston, Me., made under requirement in the river and harbor act approved July 25, 1912.

2. Wessaweskeag is the original Indian name for the stream. It has been abbreviated and appears on the Coast Survey charts as "Weskeag" and locally has been further abbreviated to "Keag." It is a tidal estuary or basin on the west side of the mouth of Penobscot Bay and opens into Muscle Ridge Channel. It approximates 1,000 feet across at the mouth, and from there the thread of the stream meanders in a general northwesterly and northerly direction about 2½ miles to the head of navigation, where is located the village of South Thomaston. The stream or estuary contains long shallow coves of such extent as to form a tidal basin of considerable area. Above the village of South Thomaston there is a shoal basin about 1½ miles in length with a greatest width of about one-quarter of a mile. The village of South Thomaston is about 4 miles south of the city of Rockland and about the same distance southeast from Thomaston. The village of South Thomaston is about in the center of the town of South Thomaston, the nearest point of the town line being about 2 miles distant. The locality is shown on Coast Survey chart No. 312. A sketch map showing the high-water line, an enlargement of Coast Survey chart, is herewith. The line of soundings following the thread of the stream on the sketch map represents data collected during a recent examination and is approximately correct. It represents about the center of the low-tide channel. Practically all the remainder of the basin is dry at low tide. The wharf locations, quarries, etc., are also new data.

3. The town of South Thomaston was credited in 1900 with a population of 1,426. The village of South Thomaston is a settlement of probably about 30 houses. Besides these there are two churches, two general stores, a mill, two small granite yards, and two or three small variety and confectionery stores. At the head of navigation, around which the village has grown, there is a dam across a narrow place in the stream, and here is located a tide mill which derives power from the tidal filling and emptying of the basin above. The mean tidal range is 9.6 feet. The head is limited to that due to the tidal rise, there being practically no drainage into the upper basin. This mill has been applied to different uses, being at one time in use as a sawmill, at another time as a gristmill, more recently for cutting and polishing granite, but is now idle and has been for the last few years.

4. No work has ever been done by the General Government at this locality. Except immediately at the town the least depth at mean low tide appears to be about 3½ feet, opposite Haydens Point. Near the dam the channel shoals to about 2 feet. The mean tidal range

being 9.6 feet, gives a depth of about 11 feet at high water up to the wharves at South Thomaston. There are large granite deposits and several quarries have been opened in the near vicinity of the river and it is stated that some of the material is of superior quality and would find a ready market if cheap transportation were available. Formerly lime was manufactured here, but it is understood that it could not compete in quality with that made at Rockland. It is reported that there are a number of small fishing boats belonging along the river, but nothing was learned as to their operations.

5. I visited the locality early in October, 1912. Travel to and from South Thomaston is ordinarily by four stages, two each way daily, to Rockland and two to Thomaston. An electric railway running from Rockland to Crescent Beach, a summer resort, approaches within about 2 miles of the village of South Thomaston, and it is said that in another year a branch will be run to South Thomaston itself.

6. What is desired for this place is a deepening of the channel so as to give at least 6 feet at mean low tide from the mouth of the river up to the village of South Thomaston. This will include at least the removal of a shoal at the mouth of the river and a general deepening from the lower side of Haydens Point up to the wharves at South Thomaston, including more or less ledge excavation. The proportion of the latter could not be developed satisfactorily within the scope of a simple examination.

7. Persons interested in the project for improvement at this locality represent that the village of South Thomaston was at one time the center of commercial activity for the surrounding country and that at that time the city of Rockland was but a fishing village. It is stated that vessels drawing 14 feet of water could get to the wharves. A considerable quantity of lime was manufactured and shipped, several granite quarries were in operation along the river, a large mill was run by the power supplied at the dam, fishing craft made the town a base, vessels were built, transportation rates were low, and the town was busy. It is claimed that the prosperity of the town continued until the river began to fill up. It is stated that the vessels experienced difficulty in getting in and out of the river, business was diverted to Rockland, instead of 14 feet of water at the wharves there is now but 9 feet, the town is dependent on wagon haul from the city of Rockland, and that business has declined accordingly. It is claimed that could the river be restored to its original depth so that 14 feet or more could be had the old condition of prosperity would return, and, among other things, that the deepening of the river would greatly increase the water power at the dam, provide power for industries throughout the community, and prove a tremendous factor in restoring the business of the place, coal could be brought in at a decided saving, and that opportunity would be afforded for placing granite on the market in competition with other localities.

8. Rockland, lying about 4 miles to the north of South Thomaston village, is a city of from 8,000 to 10,000 inhabitants. It has a fine harbor upon which the Government has spent about $920,000, is the terminal of a branch of the Maine Central Railroad, has direct steamer connection with Boston and Portland, besides many smaller lines running to near-by points. It is the center of lime manufacture on a large scale, is an extensive shipping point for granite, supplies, etc., and is easily the most important place on the Maine coast east of Bath.

9. It is my opinion that the decline of business at South Thomaston is not due to the filling up of the river, but may in a measure be due to the superior advantages at Rockland. Shipbuilding of the type of the old days is of the past. There is about 1 foot of water in front of the dam at South Thomaston at low tide and an increasing depth from there to the mouth, so that the claim that dredging of the river would improve the water power at the head of navigation is without foundation. There does not seem to me to be any serious effort on the part of the people of South Thomaston to do business by water. With a rise of nearly 10 feet and a depth of from 2 to 4 feet at mean low tide one should be able to carry at least 12 feet under ordinary conditions and more on the high run of tides. Many localities are doing quite a business on depths no greater and thereby give proof of a need for greater accommodations. It does not appear to me that at South Thomaston use is made of the facilities already existing, and from my personal inspection and from what I have learned by investigation I have formed the opinion that the demand for an improvement in Wessaweskeag River arises from the hope that former industries may be thereby revived. There is nothing in the way of existing effort by which actual need can be proved. At the present time there is no appreciable commerce that can be learned of, and about one-half the granite shipments, even if there were such, would go from the lower part of the river, where there is already greater depth. The shipments this year have consisted in one small cargo of paving blocks from the village and one small cargo of building stone from a quarry near the mouth.

10. There are four private wharves at South Thomaston and abundant opportunity for the construction of others were they needed. These wharves, I understand, are open to all on equal terms. There are no questions of land reclamation involved in the proposed improvement and no matters of water-power development other than that indicated above, though a proposition was advanced some years ago, but I believe long since abandoned, to place a dam across the mouth of the stream and use the head of the tide for development of power through the medium of compressed air.

11. In view of the fact that practically no business is being done on the Wessaweskeag River, notwithstanding the present possibility of its being utilized to a considerable degree, of the fact that any useful improvement could not be accomplished save at some considerable cost, and of the improbability in my judgment of such improvement producing a revival in business through its influence alone, I am of the opinion that Wessaweskeag River at South Thomaston, Me., is not worthy of improvement by the General Government.

W. E. CRAIGHILL.

[First indorsement.]

OFFICE OF THE DIVISION ENGINEER, NORTHEAST DIVISION,
New York, December 2, 1912.

To the Chief of Engineers, concurring in the recommendations of the district engineer.

W. M. BLACK,
Colonel, Corps of Engineer.

[For Report of the Board of Engineers for Rivers and Harbors, see page 2.]

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S. Chart No. 312.

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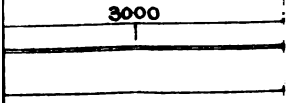

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No 1371.

HARBOR AT SPRING BAY, ILL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF HARBOR AT SPRING BAY, ON THE ILLINOIS RIVER, BETWEEN COPPERAS CREEK AND LA SALLE, ILL., WITH A VIEW OF IMPROVING IT BY DREDGING TO A SUITABLE NAVIGABLE DEPTH.

FEBRUARY 8, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, February 7, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Lieut. Col. Geo. A. Zinn, Corps of Engineers, dated November 29, 1912, on preliminary examination of harbor at Spring Bay, on the Illinois River, between Copperas Creek and La Salle, Ill., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 6, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of harbor at Spring Bay, on the Illinois River, between Copperas Creek and La Salle, Ill.

1. There is submitted herewith, for transmission to Congress, report dated November 29, 1912, by Lieut. Col. Geo. A. Zinn, Corps of Engi-

neers, on preliminary examination of harbor at Spring Bay, on the Illinois River, between Copperas Creek and La Salle, Ill., with a view of improving it by dredging to a suitable navigable depth, called for by the river and harbor act approved July 25, 1912.

2. The town of Spring Bay is situated on the east side of the Illinois River, 12 miles north of Peoria, and is reported as having a population of 128 in 1910. The main channel of the Illinois River, which is under improvement with a view of securing a depth of 7 feet at low water, is some distance from the bank, and except at high water it is difficult or impossible for boats to make a landing at the village. The improvement desired appears to be a suitable connection with the shore. Work by the General Government has been confined to the main channel of the stream. In order to make it possible for boats to land throughout the year a channel would be required extending from the main channel of the Illinois River to the high-water bank line, having a width of about 150 feet and a depth of 7 feet at low water. Such a channel would undoubtedly be shoaled annually by heavy deposits of silt from the river. In the opinion of the district officer the improvement now desired is in the nature of terminal facilities, and should not be undertaken by the General Government. The division engineer concurs in this opinion.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of harbor at Spring Bay, on the Illinois River, between Copperas Creek and La Salle, Ill., with a view of improving it by dredging to a suitable navigable depth, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 14, 1913.

To the Chief of Engineers, United States Army.

1. Spring Bay is a village situated on the Illinois River. It has a small commerce handled partially by rail and partially by water. The main channel in the Illinois River is some distance from the river bank on which the village is located, and, except at high stages, it is difficult or impossible for boats to make a landing at the village. The improvement desired appears to be a suitable connection with the shore.

2. Improvement of the Illinois River by the United States has been confined to securing a main channel 7 feet in depth at low water, and

the district officer and division engineer are of opinion that the improvement desired at Spring Bay Harbor is in the nature of terminal facilities that should not be provided by the General Government.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

4. It is not customary for the Federal Government to provide auxiliary channels, causeways, or embankments to connect the main channel of an improved river with the shore, and there appears to be no good reason in this case to depart from the usual custom. The board reports, therefore, concurring with the views of the district officer and the division engineer, that it is not advisable for the United States to undertake the improvement of Spring Bay Harbor, Ill.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF HARBOR AT SPRING BAY, ON THE ILLINOIS RIVER BETWEEN COPPERAS CREEK AND LA SALLE, ILL.

UNITED STATES ENGINEER OFFICE,
Chicago, November 29, 1912.

SIR: 1. I have the honor to make the following report of an examination of Spring Bay, as provided for by an item in section 2 of the river and harbor act approved July 25, 1912, as follows: Harbor at Spring Bay, on the Illinois River, between Copperas Creek and La Salle, Ill., with a view of improving it by dredging to a suitable navigable depth.

2. The so-called "Harbor at Spring Bay" is located on the east side of the Illinois River, 12 miles north of Peoria, Ill., 22 miles north of Pekin, Ill., and 174 miles from the mouth of the river. The accompanying drawing, made from the survey of the Illinois River of 1902–1904, shows approximately the conditions now existing at Spring Bay Harbor. There is no special waterway which can properly be called a harbor, unless it be the channel dredged in 1904 from the main channel of the Illinois River into the river bank by private parties.

3. Years ago an embankment to serve as a roadway was built by private individuals from the high-water shore line out to the low-water shore line. The embankment was about one-fourth of a mile long with its top at an elevation of about a 6-foot stage in the river. Its end was bulkheaded and served as a landing for packet boats at low stages of the river. The flow of water through the Chicago Drainage Canal has raised the low-water stage of the river at this point about 6 feet, and as a consequence the road and landing are not now of any use.

4. In 1904 Smith-Hippen Co., of Pekin, dredged a channel from the main channel of the river to their elevator in Spring Bay and built a pile and timber dock or bulkhead along the road leading out to the old landing. The bulkhead was washed out in a number of places and the channel partially filled up by floods coming out of Blue Creek. During the year 1912 the channel was redredged to a width of about 50 feet and a depth varying from 4½ feet to 7 feet when the river is at a stage of 8 feet above low water of 1879. The Spring Lake Packet Co. uses the dredged channel, but it is too narrow and crooked for the La Salle and Peoria packet boats. When the river is at a stage above 10 feet referred to low water of 1879, the packet boats can land at the river bank, a condition which exists about three months every year.

5. The town of Spring Bay, located at Spring Bay Harbor, had a population in 1910 of 128 persons. There are 5 stores, 1 church, 1 elevator, and about 40 houses. The surrounding country is farm land above overflow and having good roads. The nearest railroad station is Metamora, on the Chicago & Alton Railroad, 10 miles distant. Shipments from the town consist principally of grain and other farm products and are made by boat when the stage of water in the river is favorable, or by team and rail when boats can not reach the landing.

6. The elevator is owned by Smith-Hippen Co., of Pekin. Grain purchased by that company is shipped to Pekin via the Spring Lake Packet Co. This packet company owns a steamboat and several barges and makes a business of towing grain between various points on the Illinois River. The packet company's rates on grain are 4.5 cents per 100 pounds Spring Bay to Pekin. The rail rate on grain from Metamora to Peoria is 4.2 cents per 100 pounds, but no grain is shipped from Spring Bay by rail. The prices paid by Smith-Hippen Co. for grain at Spring Bay are practically the same as those paid by other companies at Metamora. Smith-Hippen Co. do not have an elevator at Metamora.

7. The grain business of Smith-Hippen Co. at Spring Bay amounts to about 2,800 tons annually, with a valuation of about $50,000. The traffic of the La Salle & Peoria Packet Co. at Spring Bay amounts annually to about 50 tons with a valuation of about $5,000. Shipments from Spring Bay and immediate vicinity by rail amount to about 250 tons annually. A considerable tonnage is hauled to Peoria by team, but I have no means of knowing the amount.

8. There are no wharves or terminal facilities other than those provided by the elevator.

9. As stated in previous paragraphs, landings are difficult to make at Spring Bay at all times of the year, and for packet boats they are impossible during nine months in the year. In order to make it possible for boats to land throughout the year a channel is required extending from the main channel of the Illinois River to the high-water bank line, having a width of about 150 feet and a depth of 7 feet at low water. To construct such a channel would require the removal of about 30,000 cubic yards of mud, at a cost of about $4,500. Such a channel would undoubtedly be shoaled annually by heavy deposits of silt from the river.

10. If carried out these improvements would permit shipments to be made from Spring Bay by water at all seasons of the year. Ship-

ments now made by rail and by teams would probably all go by water, thus saving to the producer a team haul of from 5 to 10 miles on about 2,500 tons of grain besides the produce. The Smith-Hippen Co.'s business would be increased by the former amount, and the business done by the La Salle & Peoria Packet Co. would probably increase several hundred per cent. An alternative plan of improvement would be to rebuild the old road to a proper elevation, so that packets could land at its end when the river was below the stage when boats could reach the landing.

11. The improvement of the Illinois River so far made by the United States Government has consisted in providing a channel in the river bed itself. No work has been done elsewhere than in the main river channel. No plans or proposals have ever been made by Government officers for side channels to enable boats to reach special points alongside the river bank or for constructing embankments whose sole purpose is to enable boats to moor against them. The work above mentioned as required at Spring Bay Harbor for the improvement of navigation facilities is, in my opinion, in the nature of terminal facilities, and for that reason should not be undertaken by the National Government.

12. I am therefore of the opinion that Spring Bay Harbor is not worthy of improvement by the United States.

Very respectfully,

GEO. A. ZINN,
Lieut. Col., Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, WESTERN DIVISION,
St. Louis, Mo., November 30, 1912.

To Chief of Engineers, concurring in the opinion of the district officer, as expressed in paragraphs 11 and 12, that the improvement desired at Spring Bay, Ill., is in the nature of a terminal facility and should not be undertaken by the National Government.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

[For Report of the Board of Engineers for Rivers and Harbors, see page 2.]

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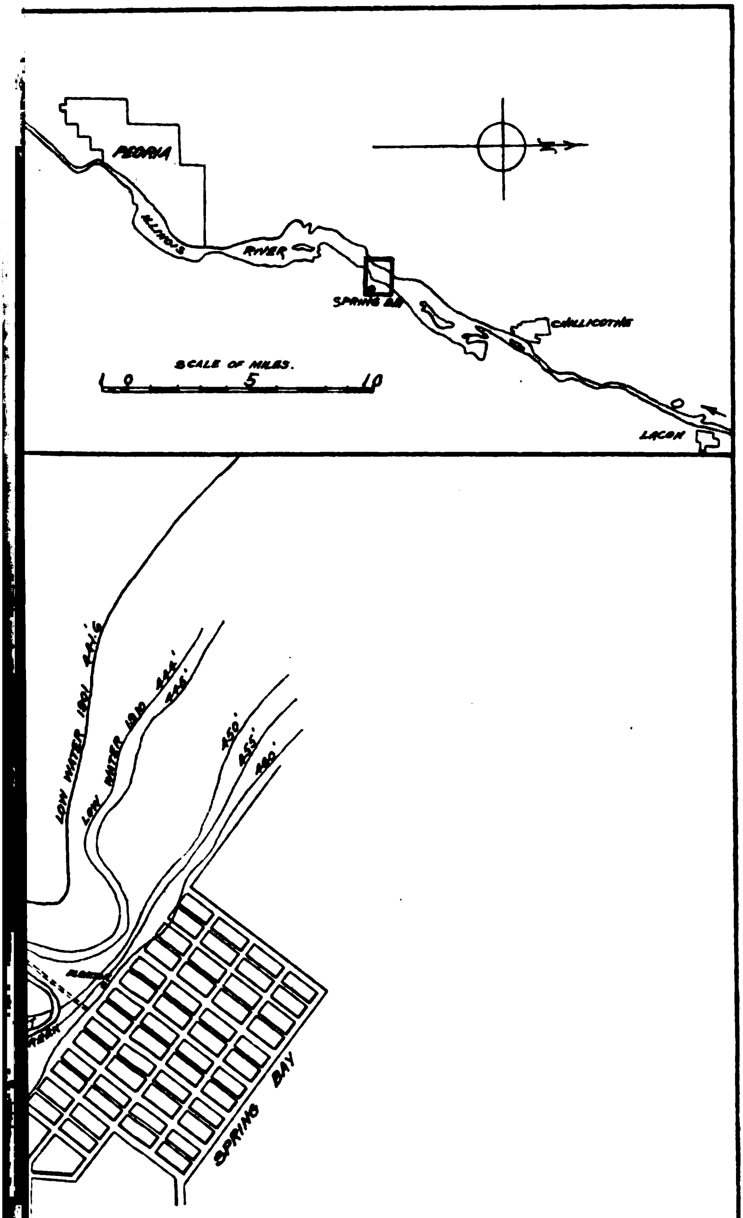

ILLINOIS RIVER, ILL.

SHOWING

SPRING BAY HARBOR.

1912

SCALE:

1000 0 1000 2000 3000 Ft.

ELEVATIONS HAVE REFERENCE TO MEMPHIS DATUM.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1382.

STURGEON BAY AND LAKE MICHIGAN SHIP CANAL, WIS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF STURGEON BAY AND LAKE MICHIGAN SHIP CANAL, WIS., WITH A VIEW TO PROVIDING A TURNING BASIN AT OR NEAR THE WESTERN END.

February 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, February 10, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 8th instant, together with copies of reports from Lieut. Col. Geo. A. Zinn, Corps of Engineers, dated October 21 and December 9, 1912, with maps, on preliminary examination and survey, respectively, of Sturgeon Bay and Lake Michigan Ship Canal, Wis., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 8, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Sturgeon Bay and Lake Michigan Ship Canal, Wis.

1. There are submitted herewith, for transmission to Congress, reports dated October 21 and December 9, 1912, with maps, by Lieut.

Col. Geo. A. Zinn, Corps of Engineers, on preliminary examination and survey, respectively, of Sturgeon Bay and Lake Michigan Ship Canal, Wis., with a view to providing a turning basin at or near the western end, called for by the river and harbor act approved July 25, 1912.

2. Sturgeon Bay and Lake Michigan Ship Canal is an artificial waterway connecting Lake Michigan and Green Bay. It was originally constructed by a private company, but was purchased by the United States in 1893 and subsequently enlarged to provide a depth of 21 feet. The westerly 1,000 feet of the canal is used by vessels seeking refuge from storms. As this portion of the canal is only 250 feet wide between revetments, it is impossible for the large sized vessels to turn therein. The district officer is of opinion that the proposed turning basin is necessary in the interests of general commerce, both present and prospective, and that its construction should be undertaken by the United States at an estimated cost of $33,000 and about $500 per annum for maintenance. The division engineer concurs in this opinion.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its accompanying report, dated December 23, 1912, concurring with the views of the district officer and division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Sturgeon Bay and Lake Michigan Ship Canal, Wis., with a view to providing a turning basin at or near the western end, is deemed advisable, following in general the methods described in the report of the district officer, at an estimated cost of $33,000 for first construction and $500 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost of the improvement.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

The Chief of Engineers, United States Army.

1. This is a report on survey of Sturgeon Bay and Lake Michigan Ship Canal, Wis., with a view to providing a turning basin at or near the western end. This canal was originally constructed by a private corporation for the purpose of facilitating navigation between Lake Michigan and Sturgeon Bay. Under the act of July 13, 1892, the canal was purchased by the United States and has been since enlarged, and two converging piers have been constructed inclosing

an area of about 10 acres at the Lake Michigan end of the canal for the purpose of affording a harbor of refuge. Owing to its limited dimensions, the harbor has little value as a harbor of refuge. The locality, however, is sought for this purpose, the vessels passing through the canal and mooring at its western end. It has been found, however, that the larger vessels can not turn owing to the restricted width, and on this account must proceed down Sturgeon Bay for a distance of about 4 miles, and vessels 400 feet or more in length must go even farther for the purpose of turning. The alternative is to continue up Sturgeon Bay, passing from that body of water into Lake Michigan through the natural outlet by way of "Death's Door," known to be a dangerous passage and used only when absolutely necessary.

2. The purpose of the present examination is to widen the channel near the western end of the canal in order that vessels may turn after having entered for refuge and proceed on their way when the storm has ceased.

3. Statistics show that during the five years, 1907–1911, inclusive, 317 steam vessels, 334 sailing vessels, and 111 unrigged vessels, making a total of 762, an average of 152 per year, sought refuge in this canal. The value of the cargoes carried by these vessels is given as approximately $4,051,483, and the value of the vessels is estimated at $10,246,000.

4. The district officer presents a plan for the widening of the canal a short distance west of the western end, so as to afford a turning basin with a maximum width of 500 feet for a distance of about 600 feet, with easy approaches, the depth to be the same as the project depth of the canal, namely, 21 feet. It is proposed to leave the basin unrevetted in order that it may be enlarged in the future, should the use of the harbor as a refuge for large vessels demand it. The estimated cost of the improvement is $33,000 and not over $500 per year for maintenance. As outlined above, the plan is recommended by the district officer and the division engineer.

5. Believing that the expenditure proposed in creating a turning basin to facilitate the navigation of vessels seeking refuge at this harbor as proposed above is reasonable when compared with resulting benefits to general commerce and navigation, the board concurs with the district officer and the division engineer in recommending the adoption of the project outlined above, which provides for the widening of the channel near the western end of the canal to a width of 500 feet for a distance of 600 feet, with easy approaches, the depth to be 21 feet, at the estimated cost of $33,000 and not over $500 per year for maintenance. The whole amount should be made available in one appropriation.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF STURGEON BAY AND LAKE MICHIGAN SHIP CANAL, WIS.

War Department,
United States Engineer Office,
Milwaukee, Wis., October 21, 1912.

From: Lieut. Col. Geo. A. Zinn, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination, of Sturgeon Bay and Lake Michigan Ship Canal, Wis.

1. The river and harbor act approved July 25, 1912, contains an item providing for preliminary examination of Sturgeon Bay Canal, Wis., as follows:

> Sturgeon Bay and Lake Michigan Ship Canal, Wis., with a view to providing a turning basin at or near the western end.

2. In accordance with the provisions of said item and instructions contained in department letter dated August 3, 1912, the following report is submitted.

3. Sturgeon Bay and Lake Michigan Ship Canal is an artificial waterway connecting Lake Michigan and Green Bay through an estuary of the latter known as Sturgeon Bay. The head of Sturgeon Bay is separated from Lake Michigan by a narrow neck of land having a width at the site of the canal of about 1⅜ miles and a maximum elevation above the lake level of about 28 feet. The canal was constructed through this neck during the years 1872–1881 by the Sturgeon Bay and Lake Michigan Ship Canal & Harbor Co., a corporation organized under the laws of the State of Wisconsin.

4. The purpose of this canal was to shorten the sailing distance between ports on Green Bay and those in the southern part of Lake Michigan. The natural passage between Green Bay and Lake Michigan is through what is known as "Death's Door," which lies between Washington Island and the northerly end of the Peninsula separating Green Bay from Lake Michigan. The sailing distance from Green Bay to the southern part of Lake Michigan through this passage is from 50 to 75 miles longer than through the Sturgeon Bay Canal. Owing to the numerous detached reefs and shoals obstructing navigation, and the strong currents setting in or out according to the direction of the wind, this passage is a dangerous one, especially in the spring and fall of the year and many disasters have occurred there.

5. The canal company constructed a canal 7,200 feet long and 100 feet wide at the water surface, with a depth of 14 feet below the present datum plane of harbor improvements, the latter plane being 581.63 feet above mean tide at New York City. The canal was built without locks or gates. Of the 14,400 linear feet of canal banks, only 8,437 feet were provided with pile revetments. For complete histories of the canal and descriptions of the work done by the canal company, see annual reports, Chief of Engineers for 1883, pages 1657–1678, and 1887, pages 2017–2037.

6. The "harbor of refuge," so called, at the easterly entrance to the canal really constitutes a part of the canal. It was constructed by the United States, the original project having been adopted in 1873. This project, as subsequently modified, provided for two

converging piers 850 feet apart at the shore line, the width at entrance being 335 feet and inclosing an area of about 10 acres. The project depth of channel was 17 feet below datum. The piers were completed in 1884 and the dredging to 17 feet in 1886. As a "harbor of refuge" it is entirely valueless, it being impracticable for a vessel of any size to moor therein; but as an exterior work, affording a safe entrance to the canal from Lake Michigan in stormy weather, it is absolutely essential.

7. The act of July 13, 1892, appropriated $81,833 for the purchase of the canal by the United States, and on April 25, 1893, the United States took possession.

8. The original project for the improvement of the canal, adopted in 1894, provided for building 6,000 linear feet of revetment, width between new revetments to be 160 feet, and for a channel 15 feet deep. This project was modified in 1896 to provide for a width of 250 feet between revetments for the westerly 1,000 feet of the canal, and for increasing width between revetments, whenever rebuilt, to 160 feet. This project as modified was completed in 1903, the original revetments having been rebuilt and the projected widths obtained throughout the entire canal.

9. The present project of improvement, adopted June 13, 1902, consolidated the canal and harbor entrance and provides for a depth of 21 feet below datum from Lake Michigan to Sturgeon Bay. (H. Doc. 117, 56th Cong., 2d sess.) The act of March 2, 1907, authorized dredging in the vicinity of Hills Point, the location of which is shown on map accompanying this report.

10. The present project has been completed. The canal has been revetted for its entire length and a channel has been dredged to the full project depth with a least width of 200 feet from the westerly end of the canal to deep water in Sturgeon Bay.

11. The westerly 1,000 feet of the canal is used by vessels seeking refuge from storms. The canal banks along this portion are provided with mooring piles at suitable intervals and vessels are permitted to moor along the revetments. During the last five years a considerable number of vessels have sought refuge in the canal, as is shown by the following statistical table which has been prepared by the superintendent of the canal from official records:

Statement showing the class, number, and net tonnage of vessels coming in from Lake Michigan during the years 1907, 1908, 1909, 1910, and 1911, to seek shelter in the canal or in Sturgeon Bay from storms.

Year.	Steam.		Sail.		Unrigged.		Total.	
	Number.	Net tons.	Number.	Net tons.	Number.	Net tons.	Number.	Net tons.
1907	57	27,995	56	9,008	20	15,263	133	52,266
1908	80	26.861	72	14,671	41	30,976	193	72,508
1909	79	38,716	91	19.890	31	21.265	201	79,871
1910	59	21,326	69	12,327	11	9.682	139	43,335
1911	42	21,032	46	11.787	8	6,341	96	39,160
Total	317	135,930	334	67,683	111	83,527	762	287,140

12. The value of the cargoes carried by the 762 craft that came in from Lake Michigan during the five years from 1907 to 1911, inclusive, is approximately $4,051,483, and the total value of the vessels sheltered is estimated at $10,246,000. The principal items of cargo and quantity carried by these vessels while thus sheltered are as follows:

43,407,000 feet b. m. lumber.
27,130 short tons coal.
315,000 bushels grain.
14,388 short tons iron ore.
5,222 short tons cement.
9,443 short tons general merchandise.
67,001 short tons rubble stone.
115,675 railroad ties.
25,000 telegraph poles.
5,335 barrels oil.
25,391 barrels salt.
4,737 cords wood.

13. As this portion of canal is only 250 feet wide between revetments it is impossible for the larger sized vessels to turn therein. From the westerly end of the canal there is a dredged channel, generally 200 feet wide, extending to deep water in Sturgeon Bay, just below Hills Point. The natural depth on either side of this channel is about 6 feet at the head of Sturgeon Bay, gradually increasing to 18 feet opposite the city of Sturgeon Bay. In consequence a vessel longer than about 225 feet is obliged to proceed down Sturgeon Bay to a point nearly opposite the city of Sturgeon Bay, a distance of about 4 miles, in order to turn before resuming her voyage on Lake Michigan. Vessels 400 feet or more in length would have to proceed still farther down the bay, probably at least 4 miles farther, before being able to turn. This would necessitate passing through the drawbridge owned by the city of Sturgeon Bay and used jointly as a railway and highway bridge. The bridge is turned by hand and has a clear height of 12 feet above mean lake level with a clear width of 77 feet in each draw opening. As a matter of fact vessels of a greater length than about 250 feet seldom if ever seek refuge in the canal on account of the difficulties and delays in winding. The following instance is an illustration of the present drawbacks to the canal as a harbor of refuge:

14. On November 12, 1911, the steamer *Samuel Mitchell*, 293 feet long, having in tow the barge *Chickamauga*, 322 feet long, sought shelter in the canal from a fierce northerly gale and blinding snowstorm. The captain of the *Samuel Mitchell* would not attempt to turn the *Chickamauga* in the channel east of the city bridge, fearing that he might get the barge aground. He believed it would be safer and more expeditious to return to Lake Michigan via "Death's Door" passage, which he proceeded to do. In reporting this case, Mr. Adam N. Dier, superintendent of Sturgeon Bay Canal, states:

> I have been informed that the fact that there was not turning room easterly from the bridge for the *Chickamauga* has been widely advertised among vessel men, and until more adequate turning facilities are provided at the head of Sturgeon Bay for large craft seeking shelter in the canal or in Sturgeon Bay, this harbor will be entered only as a last resort by the larger class of vessels.

15. The canal is designed solely for the passage of vessels and there are no wharves nor terminal facilities for commercial purposes. The only wharves or landing places along the canal are for transferring

Government property. No water power can be developed in connection with the canal.

16. It is believed that Sturgeon Bay Canal would be used by vessels as refuge to a far greater extent than at present if it were not for the difficulty and delay in turning the vessel later on. In order to obtain the general opinion of marine interests as to the advisability of creating a suitable turning basin at the westerly end of the canal, a circular letter[1] was addressed to those concerned, a copy of which is forwarded herewith. A large number of replies,[1] forwarded herewith, were received, all of which, with one exception, are strongly in favor of the turning basin.

17. On the accompanying map is shown the location of the proposed turning basin. The inset on said map shows the general location of Sturgeon Bay Canal with reference to the northern part of Lake Michigan. In the fall of the year, when the prevailing winds are from the northwest, a considerable number of vessels bound to the southerly end of Lake Michigan seek a lee under the west shore. The only point at which good refuge can be obtained along the west shore of Lake Michigan north of Manitowoc is at Sturgeon Bay Canal. It is believed that if a commodious turning basin were provided the canal would be used as a harbor of refuge by a much larger number of vessels than at present. A turning basin which would be suitable for all vessels should have a width of about 800 feet and a length of about 1,000 feet. It is believed, however, a basin 500 feet wide and 600 feet long would be large enough for present needs. This basin should be obtained by widening the present channel, probably on both sides. Should it eventually become necessary, the basin could readily be widened and lengthened. The depth of the basin should, of course, be the same as the depth of the canal. It would not be necessary to revet the basin; the work would consist entirely of dredging and the material is known to be very soft and easily dredged.

18. For the reasons before stated I am of the opinion that the proposed turning basin is necessary in the interests of general commerce, both present and prospective, and that its construction should be undertaken by the United States. I therefore recommend that a survey be made, and an estimate of cost prepared.

Geo. A. Zinn.

[First indorsement.]

Office of the Division Engineer, Lakes Division,
Buffalo, N. Y., November 1, 1912.

The Chief of Engineers, United States Army:

I concur in the opinion of the district officer that the locality is worthy of improvement by the General Government, and recommend that survey and estimate of cost be made.

J. G. Warren,
Colonel, Corps of Engineers,

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[1] Not printed.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 11, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer and division engineer in recommending a survey in order to determine the extent and advisability of the proposed improvement.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

UNITED STATES ENGINEER OFFICE,
Milwaukee, Wis., December 9, 1912.

From: Lieut. Col. Geo. A. Zinn, Corps of Engineers.
To: The Chief of Engineers, U. S. Army.
(Through the Division Engineer.)
Subject: Survey of Sturgeon Bay and Lake Michigan Ship Canal, Wis.

1. In accordance with instructions contained in department letter dated November 14, 1912, the following report is submitted on a survey of Sturgeon Bay Canal, Wis., "with a view to providing a turning basin at or near the western end."

2. Sturgeon Bay Canal and its connecting channels are described in a report on preliminary examination submitted October 21, 1912. This report also contains a statement of the various projects for improvement and statistics of the commerce which has sought shelter in the canal during the past five years. There are no additional facts or arguments to present for the proposed improvement other than were contained in the report on preliminary examination.

3. There is forwarded herewith a map showing the westerly end of Sturgeon Bay Canal and that portion of the channel at the head of Sturgeon Bay where it is proposed to locate the turning basin. An inset map of smaller scale shows the general relation of the proposed turning basin to Lake Michigan and deep water in Sturgeon Bay.

4. In order to make the turning basin most available it is believed it should be located as closely to the westerly end of the revetted canal as practicable. Vessels seeking shelter in Sturgeon Bay Canal are usually moored to the revetments on either side at the westerly end where the canal is 250 feet wide in the clear. Vessels so moored are out of the way of any other craft which may seek to pass through the canal and are well sheltered. As vessels seeking shelter always come in from Lake Michigan, they are headed toward the west, so that before resuming their voyage it is necessary to turn them; otherwise they would have to back through the entire length of the canal. This turning should be accomplished as closely to the canal as possible.

5. The proposed turning basin, which is really an enlargement of the dredged channel, as shown on the map, should have for the present a maximum width of 500 feet for a distance of about 600 feet with easy approaches. The depth throughout the basin should be

the same as the project depth in the canal, viz, 21 feet below a plane 581.63 feet above mean tide at New York City. It is believed that a basin of this dimension and of the depth specified will permit of turning any vessel which at the present time is liable to seek refuge in the canal.

6. It will not be necessary to revet the basin; in fact it would be undesirable to do so, for if in the future a larger class of vessels should seek refuge in the canal it might then be necessary to increase the width of the basin. This can be readily done by dredging.

7. The material is soft and is easily dredged. It consists of a layer of fine alluvial matter overlaying a rather soft marl. The banks of the dredged channel have stood well since the channel was dredged in 1903, and little or no dredging for maintenance has been required in this portion of the channel.

8. The estimated cost of the work recommended, as shown on the map, is as follows:

Dredging 250,000 cubic yards, at 12 cents	$30,000
Contingencies, superintendence, etc., 10 per cent	3,000
Total	33,000

9. The last large contract for deepening this channel was at a price of 9.9 cents per cubic yard. Allowing for increase in wages, etc., it is believed, in view of the soft material and the favorable location for doing the work, that 20 per cent increase should be ample to cover the cost of doing this work.

10. After the turning basin is dredged the lines of same should be marked by buoys to enable a vessel to keep within the limits of the basin. It would be better to mark these lines by buoys rather than by driving piles. During the winter the bay freezes over completely, and if piles were driven they would undoubtedly be carried out each spring by the ice. Furthermore, the material is so soft that these piles could not be used advantageously as snubbing piles, as any great pull on them would probably displace them. Were piles driven, attempts would undoubtedly be made to use them as snubbing piles. It is believed that the necessary buoyage can be provided by the Lighthouse Service.

11. The turning basin should be dredged as soon as the necessary money is made available, and the entire estimated amount should be provided as the initial appropriation. Vessel men generally are heartily in favor of the proposed improvement. The work would probably require about four to five months with a single dredge. From past experience with the present dredged channel, it is believed that the cost of maintenance of the basin would be but very little, probably not over $500 a year.

12. It is believed that the proposed improvement is in the interest of general commerce, both present and prospective, and that the construction of the proposed turning basin should be undertaken by the United States.

Geo. A. Zinn.
Lieut. Col., Corps of Engineers.

[First indorsement.]

OFFICE DIVISION ENGINEER, LAKES DIVISION,
Buffalo, N. Y., December 17, 1912.

The CHIEF OF ENGINEERS:

Forwarded, concurring in the recommendations of the district officer.

J. G. WARREN,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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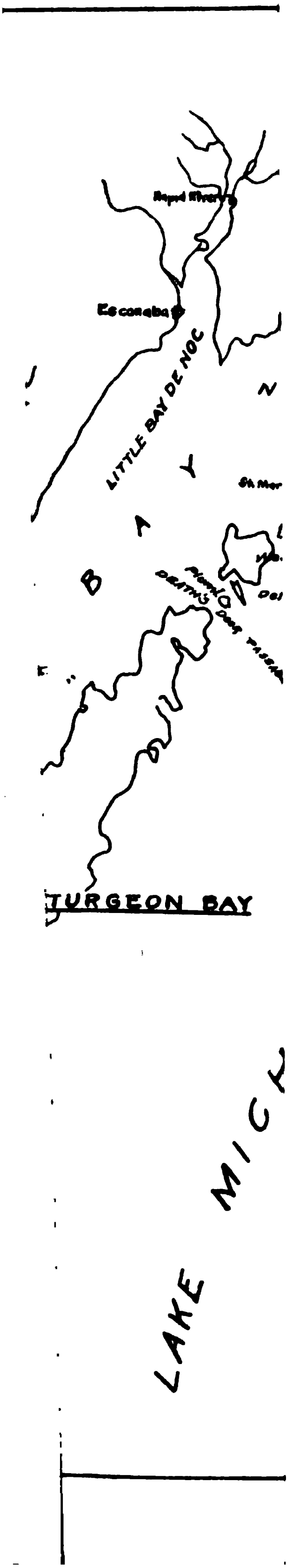
Rapid River
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LAKE MICH

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1383.

DEEP CREEK, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF DEEP CREEK, N. C., FROM ITS MOUTH ON ALBEMARLE SOUND TO THE HEAD OF NAVIGATION.

February 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 10, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 8th instant, together with copies of reports from Maj. H. W. Stickle, Corps of Engineers, dated April 18, and December 5, 1912, on preliminary examination and survey, respectively, of Deep Creek, N. C., from its mouth on Albemarle Sound to the head of navigation, made by him in compliance with the provisions of the river and harbor act approved February 27, 1911.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 8, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on examination and survey of Deep Creek, N. C.

1. There are submitted herewith, for transmission to Congress, reports dated April 18, and December 5, 1912, by Maj. H. W. Stickle, Corps of Engineers, on preliminary examination and survey, respectively, of Deep Creek, N. C., from its mouth on Albemarle Sound to

the head of navigation, called for by the river and harbor act approved February 27, 1911.

2. Deep Creek is a nontidal stream emptying into Bull Bay on the south side of Albemarle Sound. A draft of 8 feet can be carried through Bull Bay to the mouth of Deep Creek, and a depth of 6 feet is available from there to a point about 1 mile beyond, known as First Landing. The district officer states that a channel sufficient to allow of its being used for economical water transportation, considering the character of the boats employed in this vicinity, would have to be 40 feet wide and have an available depth of water of not less than 8 feet up to First Landing. The annual commerce of the locality is estimated at 2,000 tons, valued at $157,000, which commerce is at present handled by rail through Scuppernong. On account of the unfavorable situation of the inhabitants in regard to transportation, and the prospect of agricultural development if reasonable freight rates were obtainable, the district officer recommended that a survey be made. In the report on survey he submits estimates of cost amounting to $2,050 and $5,336 for procuring channels 6 and 8 feet deep, respectively, from the mouth to First Landing, the width being 60 feet in the open water near the entrance and 40 feet within the creek. The cost of maintenance is estimated at $200 per annum for the smaller and $300 for the larger channel. He expresses the opinion that improvement by the United States to the extent of providing a channel 8 feet deep is justified, contingent upon the construction by local interests of a public wharf of adequate facilities at First Landing or some point below, at a cost of not less than $500. The division engineer is of opinion that this short stream is unworthy of improvement by the United States.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 13, 1913. The board believes that commensurate benefits to general commerce and navigation would not result from the improvement of this stream, and therefore it concurs with the division engineer in the opinion that it is not advisable for the United States to undertake the work.

4. After due consideration of the above-mentioned reports and from personal experience with this class of waterways in regions not well supplied by railroads, I concur in general with the views of the district engineer, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Deep Creek, N. C., from its mouth on Albemarle Sound to the head of navigation, in the manner described in the reports herewith, is deemed advisable so far as to provide an 8-foot depth channel up to the First Landing, at a total etsimated cost of $5,400 for first construction and $300 annually for maintenance, provided that no work be done until the Secretary of War is satisfied that local interests will supply a public wharf of adequate facilities at this landing. This estimate is based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the entire estimated cost.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 13, 1913.

To the CHIEF OF ENGINEERS, U. S. ARMY:

1. A survey of Deep Creek having been made, the district officer presents estimates for channels 6 feet and 8 feet in depth, the width being 60 feet in the open water near the entrance to the creek and 40 feet within the creek, the estimates being $2,050 and $5,336, respectively, with maintenance at $200 and $300 annually. The district officer expresses the opinion that the improvement is justified in accordance with the larger estimate, stating that it is believed the 6-foot project would not meet the real needs of the waterway. The division engineer is of opinion that the improvement is not advisable. He believes the channel in the open water near the entrance should be at least 80 or 100 feet wide, and with reference to the 40-foot width in the creek he states that a shoaling naturally takes place along the edges of such a narrow channel, and that it soon becomes filled.

2. It appears to the Board that the estimate of the district officer is small both for original construction and maintenance. He states that the bottom for the whole length of the proposed excavation is thickly covered with logs, roots, and stumps, and the cut-offs are heavily timbered. It seems not improbable that the removal of such material might cost considerably more than the estimate of 23 cents per cubic yard. The channel is narrow both in the open water at the entrance and in the creek and would be subject to considerable shoaling, as suggested by the division engineer. The commerce to be benefited is very small, the adjacent territory being sparsely settled. The total tonnage is at present about 2,000, and only a part of this could be expected to go by water if the improvement were made.

3. In view of all the circumstances, the Board believes that commensurate benefits to general commerce and navigation would not result from the improvement of this small stream, and therefore it concurs with the division engineer and reports that in its opinion it is not advisable for the United States to undertake the improvement.

4. The district officer held a public hearing at the locality for the purpose of acquiring all information available, and the Board gave a hearing to the member of Congress from that district.

5. In compliance with law, the Board reports that there are no questions of terminal facilities, waterpower, or other subjects which could be coordinated with the project proposed, in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the Board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF DEEP CREEK, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., April 18, 1912.

SIR: 1. In accordance with your requirement of April 7, 1911, in pursuance of section 2 of the river and harbor act of February 27, 1911, the following report on preliminary examination of Deep Creek, N. C., from its mouth on Albemarle Sound to the head of navigation, is respectfully submitted. So far as records known to this office show, the stream has never been the subject of previous examination or survey. After correspondence between this office and parties at interest relative to the conditions desired, etc., the examination has been made by Assistant Engineer Harry T. Paterson, of this office, who for some months has been in supervision of the work on streams in its immediate vicinity. From his report and from office correspondence the facts relative to this stream given below have been collected. Deep Creek was inspected by the district officer on January 6, 1912, and on April 2, 1912, at which latter date a public hearing was held in the matter of the improvement of this stream, at Scuppernong, N. C.

2. Deep Creek is a nontidal stream emptying into Bull Bay on the south side of Albemarle Sound at a point about 4½ miles southeast of Laurel Point Light. The stream flows through a timbered swamp and its banks are only slightly above the normal level of the water surface.

3. Eight-foot draft can be carried through Bull Bay to its mouth, and a depth of 6 feet is available from there to a point about 1 mile beyond, known as First Landing, at which place there are three fish houses. From a width of about 75 feet at the mouth the stream narrows in the first mile to a width of about 25 feet. This portion of the stream has been extensively used by the lumber interests in getting out their timber, and as a result is full of sunken logs, which constitute such a menace to navigation that vessels hesitate to make use of it. It is the desire of those interested that the improvement be made to the road crossing about three-fourths of a mile above First Landing. Of this distance, in the first half mile, the available depth decreases to 4 feet and the width to 10 feet, and beyond this point the stream is from 6 to 10 feet wide, full of stumps and overhung with trees, so as to be impassable even for rowboats.

4. This stream lies wholly within Washington County, N. C., which has a population of 5,500 and an area of 400 square miles, of which only 20 per cent is under cultivation and 40 per cent, covered with standing timber.

5. There is a population of about 700 lying within 3 miles of the stream, whose chief occupation is farming. The principal farm products are cotton, corn, and peanuts, which are hauled by wagon to Scuppernong and shipped by rail from there to Norfolk. There are five retail houses in this territory, whose supplies mostly come from Norfolk; one sawmill, cutting about 100,000 feet of lumber; five cotton gins, ginning about 1,000 bales; and three gristmills, grinding some 7,500 bushels per year, all of which get their raw material from the surrounding country.

6. The annual commerce of this vicinity is estimated at 2,000 tons, valued at $157,000. This commerce is at present handled by the Norfolk Southern Railroad principally through their station at Scuppernong, and one of the principal reasons urged by interested parties for this improvement is the effect it will have upon freight rates. An example cited by them is the rate on horses and cattle, which is $7 from Norfolk to Creswell, while to Columbia, 10 miles farther, where water transportation is in competition, the rate is only $3.

7. It is also urged by those interested in the improvement that it would reclaim some tracts of land and facilitate the reclamation of others by drainage.

8. A channel sufficient to allow of its being used for economical water transportation, considering the character of the boats employed in this vicinity, would have to be 40 feet wide and have an available depth of water of not less than 8 feet up to First Landing. Above that point a serviceable channel could be narrower and shallower.

9. The physical conditions are shown on Coast Chart 141.

10. Terminal and transfer facilities are practically lacking on this stream; the only exception being the five small, privately owned fish houses at First Landing, which are in poor condition and have no wharf worthy of the name. A passable road leads to the stream at this point, and there was some years ago a wharf directly across from the road which was entirely free to the public, but which, on account of disuse, has almost entirely disappeared.

11. There are no questions of water power, flood protection, or other related subjects to be considered in connection with improvement of this stream.

12. The improvement of the stream would be of commercial benefit to a small population, and it is estimated that the freight which would make use of the stream, if navigable for 8-foot draft to First Landing and a less draft for three-fourths of a mile above First Landing, would amount annually to 1,000 tons, with a value of $75,000, which would increase after a few years availability of navigation.

13. Record[1] of the hearing held at Scuppernong, N. C., on April 2, 1912, is inclosed herewith.

14. The cost of making a survey, in order that plans and estimates might be prepared, would be $200.

15. It is my opinion, considering the unfavorable situation of the inhabitants of this vicinity as regards transportation facilities, the rate conditions existing on the Norfolk Southern Railroad for the transportation of produce from this point, and the probability of agricultural development if reasonable freight rates were made to exist, that a survey of Deep Creek is advisable, and I recommend that such a survey be authorized.

Very respectfully,

H. W. Stickle,
Major, Corps of Engineers.

The Chief of Engineers, United States Army,
(Through the Division Engineer).

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[1] Not printed.

[First indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 10, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. Deep Creek is a nontidal stream emptying into Bull Bay, on the south side of Albemarle Sound. A depth of 8 feet can be carried to the mouth of the creek, and a depth of 6 feet is available from there to a point about one mile above, known as First Landing. The width of the creek is about 75 feet at the mouth, decreasing to about 25 feet at First Landing, above which both the width and depth decrease.

3. There is a population of about 700 within 3 miles of the stream, the principal occupation being farming. The annual commerce is estimated at 2,000 tons, valued at $157,000, which commerce is at present handled by rail through Scuppernong. In connection with his preliminary examination, the district officer gave a public hearing, at which interested parties explained the needs of improvement, and on June 3 Hon. J. H. Small, M. C., came before the board for a similar purpose.

4. The district officer states that a channel sufficient for economical water transportation should be 40 feet wide and have an available depth of water of 8 feet up to First Landing, with lesser dimensions above this point. Considering the unfavorable situation of the inhabitants in regard to transportation facilities, the present railroad conditions, and the probability of agricultural development if reasonable rates were obtained, the district officer recommends that a survey be authorized at a cost of $200. In this opinion the division engineer concurs.

5. While the population and commerce of the locality are both small, and no great public benefits can be expected from the improvement, it is believed that an adequate channel would afford substantial local benefit to the small community interested. The advisability of the improvement appears to depend upon its cost, and to determine this question the board concurs with the district officer and division engineer in recommending a survey. From the description given, it does not seem practicable within reasonable limits of cost to carry the improvement beyond First Landing. It is therefore recommended that estimates be prepared for a channel 6 feet and 8 feet in depth and of suitable width from Albemarle Sound to First Landing, with a turning basin at that point if necessary.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF DEEP CREEK, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., December 5, 1912.

From: The district engineer officer.
To: The Chief of Engineers, United States Army (through the division engineer).
Subject: Survey report, Deep Creek, N. C.

1. In compliance with instructions contained in letter from the Chief of Engineers, I submit my report upon the survey of Deep Creek, N. C., with a project for its improvement and the cost of maintenance after the project may have been completed.

2. The survey of Deep Creek was made during June, 1912, and was carried from Albemarle Sound to First Landing, a little over 1 mile above Bull Bay, an arm of Albemarle Sound. There are no bridges crossing this stream below First Landing.

3. It will be noted from the map in one sheet accompanying this report that a commodious channel of over 8 feet extends well up from the sound into Bull Bay, and that the improvement in question consists largely in straightening the existing channel above. There is abundant depth from Bull Bay to Albemarle Sound.

4. This stream has, as far as known, never been under improvement nor previously surveyed by the United States Government.

5. The conditions of commerce and the probable development of commerce by the proposed improvement have undergone no change since the date of the preliminary examination report.

6. The bottom for the whole length of the proposed excavation is a soft alluvial mud, thickly covered with logs, roots, and stumps, and the cut-offs are heavily timbered. These conditions, together with the facts that the work is small in quantity and badly scattered, necessitates the assumption of comparatively high unit costs in the estimates for the work.

7. The improvements now needed are: (1) Straightening the channel by means of three cut-offs; (2) deepening the channel, and providing a turning basin at First Landing. Three ranges are shown at the mouth of the creek, extending from the 8-foot contour in Bull Bay to a point inside the mouth of the creek. The first of them 1,200 feet long, lies wholly within the 6-foot contour; the second, 1,200 feet long, goes across the shoalest part of the entrance; and the third, 600 feet long, lies almost wholly within the 8-foot contour. From the end of the third range an 8-foot contour of variable width extends for the next 1,400 feet to the first sharp point, where a cut-off is shown. Two hundred feet above this cut-off is another, with a third just above. In the next 1,000 feet the creek narrows from 60 feet to 50 feet, and for the remaining 500 feet the landing is only 40 feet wide. A serviceable channel could not be less than 40 feet wide, and the three entrance ranges should be increased in width to 60 feet.

8. To procure a channel 8 feet deep and 40 feet wide, with three entrance ranges 60 feet wide, the following estimate is submitted:

	Cubic yards.
Ranges, 1, 2, and 3:	
Between ranges 1 and 2	8,500
Three cut-offs	7,000
Upper 1,500	5,000
Turning basin, 150 feet, as shown	2,700
	23,200

Twenty-three thousand two hundred cubic yards, at 23 cents, equals $5,336. The estimate provides for side slope of 1 on 2. The estimated cost of maintenance annually is $300.

9. To procure a channel 6 feet deep and 40 feet wide, with three entrance ranges 60 feet wide, the following estimate is submitted:

Ranges, 1, 2, and 3	1,500 cubic yards.
Three cut-offs	4,900 cubic yards.
Turning basin, 150 feet, as shown	1,800 cubic yards.
	8,200 cubic yards.

Eight thousand two hundred cubic yards at 25 cents equals $2,050. The estimated cost of maintenance annually is $200. The estimate provides for side slopes of 1 on 2.

10. For either project the work should be prosecuted at a rate sufficient to complete the project in four or five months, and the entire amount should be provided as one appropriation in case of one of the projects being adopted by Congress.

11. It is my opinion that the peculiarly unfavorable status of transportation facilities in this locality, the probability of agricultural development due to the improvement, and the prospective commerce to result therefrom justify the improvement by the General Government to the extent outlined and estimated for in paragraph 8, i. e., to procure a channel 8 feet deep and 40-foot bottom width (the three entrance ranges having 60-foot bottom width), from Albemarle Sound to First Landing, at an estimated cost of $5,336, with $300 annually for maintenance. This recommendation is made contingent upon the construction, before any work of improvement by the United States be undertaken, by local interests at First Landing, or other point below, the location to be approved by the district officer, of a wharf of adequate facilities; the amount to be expended in construction proper to be not less than $500, the use of the wharf to be open to all on equal terms. The 6-foot project would be of advantage, but it is not believed to meet the real needs of this waterway adequately.

12. No extraneous facts and arguments bearing on the question of the merits of this improvement have come to the attention of this office since the report upon the preliminary examination, dated April 18, 1912, was submitted.

H. W. Stickle,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
December 7, 1912.

To the CHIEF OF ENGINEERS:

1. I am still of the opinion that this short and insignificant stream is unworthy of improvement by the General Government. If it is to be improved, however, I think that a channel 40 feet wide, dredged through broad, open water, is entirely too narrow to be permanent in character or useful for navigation. The width may be sufficient inside the creek, which is itself not much wider than this, but in the bay I think it ought to be at least 80 or 100 feet wide, and even then it must be expected to shoal up so as to require redredging at intervals.

2. In a narrow cut vessels work over against the side and push the material out into the cut and in this way cause it to shoal. A shoaling naturally takes place along the edges, but if the edges are only 40 feet apart it soon becomes filled. A channel 100 feet wide is still useful for navigation even after it has shoaled up for 20 feet along each side.

3. It is seldom wise to attempt the improvement of any locality on too small a scale.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 3.]

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1384.

COAL RIVER, W. VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF COAL RIVER, W. VA., FROM THE MOUTH TO BOONE.

February 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 8, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 7th instant, together with copy of a report from Maj. F. W. Altstaetter, Corps of Engineers, dated November 27, 1912, on preliminary examination of Coal River, W. Va., from the mouth to Boone, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 7, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on preliminary examination of Coal River, W. Va.

1. There is submitted herewith, for transmission to Congress, report dated November 27, 1912, by Maj. F. W. Altstaetter, Corps of Engineers, on preliminary examination of Coal River, W. Va.,

from the mouth to Boone, called for by the river and harbor act approved July 25, 1912.

2. Coal River empties at St. Albans, W. Va., into the Kanawha, 45 miles above its mouth. The Kanawha River has been already improved to 6 feet at low water from its mouth in the Ohio River to above Coal Creek.

3. Two preliminary examinations have heretofore been made of Coal River and Little Coal River, but no work of improvement has been done by the United States. A system of locks built for a 3 to 5 foot navigation and completed in 1857 by a private corporation, has now nearly disappeared. The Coal River boat channel now carries only about 1 to 2 feet at low water. There is no town by the name of Boone on Coal River, but it appears that a village called Madison, situated on Little Coal River, was formerly known as Boone Court House, and inquiry by the district officer indicates that this is the upper limit of the investigation contemplated by the act. The contiguous territory is sparsely settled, and there is practically no commerce on the river except the floating of logs, which industry appears to be on the decline. A suitable improvement for the shipment of coal would necessitate the construction of locks and dams at considerable expense. The valley has ample railroad facilities, and the district officer doubts if the river would afford as economical means of transportation, due to its small size and the limited amount of water available. There is but little local interest in the improvement of the stream, and for the reasons stated, the district officer believes that the river is not worthy of improvement by the General Government. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Coal River, W. Va., from the mouth to Boone, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1913.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. This river is a tributary of the Kanawha. Investigation by the district officer indicated that the improvement contemplated in the act was on the Coal and Little Coal, up to Madison or Boone Court House. The distance from the mouth of the Coal to the junction of the Coal and the Little Coal is 17½ miles, and Madison is 25½ miles above the junction, or 43 miles above the mouth. This reach was partially improved by a private company prior to 1857 by the construction of nine locks and dams. The work has not been kept in repair and has now nearly disappeared. The river is tortuous, the adjacent country hilly, and the valley narrow. At the time of the examination, which was made at a stage above low water, the discharge was 19 cubic feet per second at Madison, 35 cubic feet per second at Rome, just above the forks, and 62 cubic feet per second 4½ miles above the mouth. The river is practically dry at extreme low water. The fall is 28 feet between the mouth and the forks and 86 feet between the forks and Madison. Each of these streams has railroad transportation.

2. The principal industries are agriculture, coal mining, and lumbering. There is no commerce on the river now except the floating of logs, and it is stated that this industry is on the decline. The only commodity of commerce sufficient in extent to be considered in connection with the improvement of the river is coal. The only improvement of value would be locks and dams, but there seems to be little interest or demand for improvement. The district officer is of opinion, in which the division engineer concurs, that Coal River is not worthy of improvement.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

4. From the description of the river it is clear that the only improvement which would afford continuous navigation would be the slack-watering of the stream, and the board agrees with the district officer and the division engineer that neither present nor prospective commerce is sufficient to justify the cost of such work. It reports, therefore, that in its opinion it is not advisable for the United States to undertake the improvement of Coal River from its mouth to Boone.

5. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interest of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF COAL RIVER, W. VA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., November 27, 1912.

From Maj. F. W. Altstaetter, Corps of Engineers, United States Army.
To The Chief of Engineers, United States Army
(Through the division engineer, central division).
Subject: Preliminary examination of Coal River.

1. In compliance with letter of August 3, 1912, from the department, the following report on the preliminary examination of Coal River, W. Va., from the mouth to Boone, is submitted, as required by the river and harbor act approved July 25, 1912. The following drawings are inclosed:

K19.1-1. Map of the Coal River, showing also its relation to transportation lines in the vicinity.

K19.1-2-4.[1] Three drawings giving results of reconnaissance survey from Madison to the mouth.

2. There was some doubt as to the location of Boone, as there is no such town on the Coal River. The upper river has two branches, one of which, the Little Coal, has a village called Madison, which was formerly known as Boone Court House. I have been informed by the Congressman from that district that the examination intended by Congress was from the mouth to Madison or Boone Court House.

3. There was a preliminary examination made of the Coal River by Lieut. Col. W. P. Craighill in 1887 (see Annual Report, Chief of Engineers, 1887, pt. 3, p. 1929). Col. Craighill reported the river a not worthy of improvement. In 1894 the same officer made a preliminary examimation of the Big Coal and Little Coal rivers and reported that they were not worthy of improvement, in which the Chief of Engineers concurred (see Annual Report, Chief of Engineers, United States Army, 1895, pt. 3, p. 2465).

4. *Work done.*—The National Government has never improved this river. A private company improved this river by means of nine locks and dams; eight in the main river, and one in the Little Coal River. They were completed in 1857, and were extensively repaired or rebuilt after the Civil War. The work consisted principally of cribs of timber and stone and have now nearly disappeared.

5. *Physical characteristics, etc.*—The Coal River is a small stream that empties into the Kanawha River on its left, or south bank at St. Albans, W. Va., 45 miles above the mouth of the Kanawha and 12 miles below Charleston, W. Va. At mile 17½, measured from the mouth, is the junction of the Big Coal and Little Coal Rivers, and continuing on up Little Coal River for 25½ miles farther is Madison or Boone Courthouse, at mile 43.

The river and its branches flow in a general northerly direction through a rugged country, and, as the map shows, the river is a tortuous stream from Madison all the way to its mouth. The distance from the mouth to the headwaters is about 70 miles. With the exception of narrow strips of bottom land bordering on the rivers and larger creeks, the whole area is covered with hills which gradually increa in height, partaking of the nature of mountains. The soil is naturally rich, even to the mountain tops, and the country generally is devoid of the rugged characteristics of the majority of the streams in this section. The valley is as much as a mile wide near the mouth of the river and becomes very narrow toward the headwaters. The banks are steep and have a height of from 20 to 40 feet above low water. They are composed of fine earth, containing a considerable quantity of sand and clay. The river bed is composed principally of sand and gravel with frequent outcroppings of rock. The sand is said to be mostly quicksand, extending as deep as 12 feet, but rock is sufficiently near the surface in most places to make good foundations easy to locate.

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[1] Not printed.

A reconnoissance was made early in this month from Madison to the mouth. The mean average stage is about the same as the average stage for June and July. August to November are the low-water months, and the remainder of the year giving the higher stages.

The discharge was measured on this reconnoissance and gave 19 cubic feet per second at Madison, 35 cubic feet per second at Rome, just above the forks, and 62 cubic feet per second just below the lower falls, at mile 4½.

6. The river from the mouth to the forks of mile 17½ is about 225 feet in width from bank to bank. Backwater from Lock and Dam No. 7, Kanawha River, extends up 4½ miles to the foot of Lower Falls, which is about 10 feet high. From the head of Lower Falls is a pool about 4½ miles long to the foot of the Upper Falls. This pool has a slope of about 4 feet. The Upper Falls is 6 feet high and from there to the forks, 7 miles, is a slope of about 6 feet. This constitutes a third long pool. Over this portion of the river there is a channel depth of 1 to 2 feet, except over the falls. The total fall is 28 feet, or 1.6 feet per mile. The extreme floods are about 25 feet high, but floods in the Kanawha are about 48 feet above low water, causing backwater at the forks of 10 or 12 feet.

7. In the section of the river from the forks to Madison (mile 17½ to mile 43) the river drops 86 feet, or an average of 2.37 feet per mile. The bars were as shallow at the time of the reconnoissance as 0.1 of a foot, and it is reported that the river runs dry entirely at the time of extreme low water; what water there is seeping through the bars. The average width of the river from bank to bank was 175 feet, which narrows in places to 125 feet. This entire section of the river was covered in the reconnoissance on foot or with a buggy, as it was impossible to use a rowboat. There is such little water in this section and the pools were so shallow that the riffles and pools are not pronounced and it is difficult to distinguish them apart. Extreme flood is about 20 feet. Mean average stage is about 2 feet.

8. *Population.*—This is a rather sparsely settled valley. The following list of towns with population along that part of the river is taken from the Rand-McNally Atlas of 1910:

St. Albans (at the mouth of river)	1,209
Upper Falls	185
Bonami	23
Rome	160
Sproul	17
[illegible]	175
Danville	434
Madison	295

9. *Obstructions.*—The following is a list of the bridges on the Coal River, with their distance from the mouth, clearance, span, etc.:

Miles from mouth.	Kind of bridge.	Clearance above low water.	Length of span between piers.	Property of—
		Feet.	*Feet.*	
[illegible]	Steel through truss railroad bridge	37	98-148—98	Chesapeake & Ohio R. R.
[illegible]	Steel through truss highway bridge	34.5	184	Highway.
10[illegible]	....do	37	76-175—46	Do.
21[illegible]	Steel through girder railroad bridge	30	66-103—53	Chesapeake & Ohio R. R.
27[illegible]	Suspension foot bridge	14	200	Public.
27[illegible]	Suspension tramway bridge	20	42-175—42	Dixie Lumber Co.
39	Steel through girder railroad bridge	26.5	44-100—44	Chesapeake & Ohio R. R.
41½	Suspension foot bridge	25	160	Public.

A few remnants of the old locks and dams are left in the river. Near mile 1½ there is a crib dam which backwater from Lock No. 7, Kanawha River, drowns out. The exact condition of this dam is not known. At the lower falls there is a low dam made from three 12 by 12-inch timbers, which is used in driving the water to one side into a chute which passes over the falls. This is for moving timber. There is a sort of a dam consisting of a few logs, etc., at the upper falls to direct the water toward the gristmill, located there. Between miles 2 and 3, and around mile 5, are 47 crib-piers filled with stone, 40 by 40 feet, and about 25 feet high each. These are placed in a row up and down stream and assist in holding logs for the booms. There are two timber booms which extend very obliquely up and down stream; one of them, at mile 1, is over one-half mile long, while the second one is about 1½ miles long, extending from below mile 3 to above mile 4.

10. *Transportation facilities.*—The transportation facilities are shown on map submitted herewith, K19.1-1. The Kanawha River is locked and dammed and has a railroad on each side. The Chesapeake & Ohio Railroad crosses the Coal River near its mouth. A branch of the Chesapeake & Ohio runs up the Coal River and on each of its branches. Above Madison is another branch of the Chesapeake & Ohio Railroad, crossing from that point to the Kanawha River above Charleston.

11. *Commerce.*—The valley of the Coal River is devoted to agricultural purposes, lumbering, and coal mining. In food products the valley is not self-sustaining at present. Some of the timber in this vicinity is now being sawed into manufactured lumber at the mill and is shipped by rail. There is practically no commerce on the river except the floating of logs. One lumber dealer reports the following as the amount of lumber in the log that has been drifted out of this river in recent years:

Year.	Amount (b. m.).	Approximate in tons.
1909	950,000	1,800
1910	962,000	1,824
1911	524,000	1,048
1912 to July 1	5,924,000	11,848

And he estimates as the amount that will be floated out between July 1 and December 1 of this year as 1,000,000 b. m., or about 2,000 tons additional. The large rainfall of this year is probably the reason for the large amount of timber brought out. The man who reported this shipment also stated that they would probably be running timber from three to five years longer. A smaller concern reported that they would probably be running timber for two years longer. This industry seems to be on the decline. The Chesapeake & Ohio Railroad reports the following shipments for a year on their branch running up the Coal River from its mouth. The shipments were obtained by figuring out the actual shipments for June, 1912, and multiplying by 12:

	Tons.
Total coal movement	414,912
Total timber movement	103,572
Total of all other outgoing tonnage	16,296
Total received by Coal River Branch	35,832

12. *Possible increase in commerce.*—The State geological survey shows the Allegheny-Kanawha coal area extending throughout the valley of this river above an east and west line crossing the river near mile 14. This line is shown on drawing K19.1/1. There is undoubtedly a very good coal along this river and its development would be the only way that any considerable tonnage would go to the river. When the river was originally improved by a private company, it was improved for the purpose of shipping coal to market. The total coal shipped at that time, extending over the period from 1858 to 1880, was about 540,000 tons, or about one-half of what moves out each year on the Kanawha River at present. That coal was transported in barges about as follows: A small towboat started down the stream with two small barges, holding about 240 to 280 tons; the towboat and one barge passed through the lock and proceeded to the second lock, and while the first barge was being locked through the second lock the towboat returned to the first lock after the second barge, which had in the meantime been locked through the first lock, and so on down the river.

They shipped cannel coal, for which they received a very high price. Some coal was shipped down the Kanawha River, but after the Chesapeake & Ohio Railroad was built it was stopped above the mouth of the river, hoisted to the top of the bank, and reshipped by rail. This coal and navigating company suspended their operations, due to the decrease in price of coal, and seems to have lost heavily on its venture.

While larger locks might be built on the river, the river itself could not accommodate large tows, and even with small gasoline boats, which are cheap to run, the economy of moving coal in competition with the existing railroad is doubtful.

13. *Improvement desired.*—The only improvement which would be of any value would be by means of locks and dams, but as a rule the people in this vicinity show very little interest in the matter and the idea of improving the river came as a surprise to many of them.

14. *Conclusions and recommendations.*—The Chesapeake & Ohio Railroad gives the valley ample transportation facilities and it is very much doubted if the river would afford as economical means of transportation, due to its small size, even should there be sufficient

water and should a system of locks and dams be built. The amount of water available seems to be another objection. It is not believed that this river is worthy of improvement by the National Government and it is recommended that no survey be made.

ADDITIONAL DATA.

15. *Terminal facilities.*—There are few terminal facilities or transfers along this river. There is a small plant for loading sand, excavated from the river, into railway cars, and the log booms, referred to in paragraph 9 above, may be considered as terminal facilities.

16. *Water power.*—There is a gristmill, at present being operated by water power, at the site of the Upper Falls. Nevertheless, with the small amount of water and the cheapness of coal, the subject is not worthy of consideration.

17. *Other subjects.*—There are no other subjects requiring consideration in this connection at this time.

F. W. ALTSTAETTER.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
November 29, 1912.

THE CHIEF OF ENGINEERS:

I concur in the views of the district officer.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

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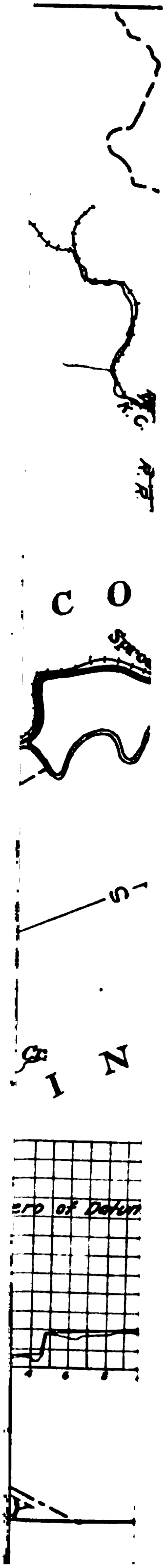
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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1385.

ELK RIVER, W. VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF ELK RIVER, W. VA., FROM THE MOUTH TO CLAY.

February 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 8, 1913.

Sir: I have the honer to transmit herewith a letter from the Chief of Engineers, United States Army, dated 7th instant, together with copy of a report from Maj. F. W. Altstaetter, Corps of Engineers, dated November 25, 1912, with map, on preliminary examination of Elk River, W. Va., from the mouth to Clay, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 7, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Elk River, W. Va., from the mouth to Clay.

1. There is submitted herewith, for transmission to Congress, report dated November 25, 1912, with map, by Maj. F. W. Altstaetter, Corps of Engineers, on preliminary examination of Elk

River, W. Va., from the mouth to Clay, called for by the river and harbor act of July 25, 1912.

2. This stream lies entirely in the State of West Virginia. It has a length of about 180 miles and empties into the Kanawha River at Charleston, which is a tributary of the Ohio River. The Kanawha River is available at low water for boats drawing 6 feet.

3. Between 1878 and 1894 about $30,000 was expended in open-channel improvement between the mouth and Addison, a distance of 139 miles, to facilitate the movement of push boats, large canoes, rafts, and loose logs. This commerce was practically all in some form of timber, which can be floated out at medium and high stages. There are deposits of coal along the river, but little progress has been made in the development of this resource. The district officer states that any increase of commerce must be based on the construction of locks and dams. The slope is steep and the discharge small, and he estimates that about 10 locks would be required to extend slack water to Clay. There appears to be little local interest in the improvement of the stream, and on account of the sparsely settled condition of the country and the limited benefits that could be expected from the large expenditure involved, he is of opinion that the river is not worthy of improvement by the General Government at this time. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Elk River, W. Va., from the mouth to Clay, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third Indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. This is a stream of steep declivity and small discharge. The distance from the mouth to Clay, the part designated in the act, is 53 miles, the fall being 116 feet. The low-water discharge was reported in 1875 to be 80 cubic feet per second and in 1894 19 cubic feet per second. The tributary country is mountainous, one or both banks are rocky, and the river is subject to sudden sharp freshets.

2. Some work of improvement was carried on between 1878 and 1894 in aid of canoe and push-boat navigation, and some benefit was derived. The improvement was also of benefit in rafting logs, timber,

and its products. The commercial statistics show that between 1883 and 1895 the commerce amounted to 25,000 tons to 140,000 tons. This was practically all in some form of timber, which can be floated out at medium and high stages. The district officer states that any increase in commerce must be based on the improvement of the river by locks and dams; that the valley is narrow and not self-sustaining on food products; that the transportation of coal, not yet developed, is the only argument for undertaking the improvement of the river; and for reasons given he does not believe that coal could be successfully and economically handled from this section by river. The district officer is of opinion, concurred in by the division engineer, that this river is not worthy of improvement by the National Government at this time.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on this subject have been received.

4. From the facts presented in this and earlier reports, it seems clear that the only improvement that could result in continuous navigation would be a system of locks and dams, but an improvement in this manner, owing to the narrowness and crookedness of the valley, would not give satisfactory facilities for coal transportation. The cost of such an improvement would be very large and in the opinion of the board incommensurate with resulting benefits to commerce. It reports, therefore, agreeing with the district officer and the division engineer, that it is not advisable for the General Government to undertake the improvement of "Elk River, West Virginia, from the mouth to Clay."

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF ELK RIVER, W. VA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., November 25, 1912.

From: Maj. F. W. Altstaetter, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Elk River, W. Va.

1. In compliance with letter of August 3, 1912, from the department, the following report on the preliminary examination of Elk River, W. Va., from the mouth to Clay is submitted, as required by the river and harbor bill, approved July 25, 1912.

2. The Elk River lies entirely in the State of West Virginia. It has an extreme length of about 180 miles, flows in a general southwestern direction and empties into the Kanawha River at Charleston.

Clay is situated 53 miles above the mouth of the river. Six drawings are inclosed, as follows:

K 14/6, showing the river from the mouth to Clay, and also its relation with respect to the principal transportation lines and rivers in the vicinity.

K 14/7, 8, 9, 10, and 11, map of the river, in five sheets,[1] from the mouth to Clay, including profiles of the river taken along its channel line, and information collected from a reconnaissance in the field.

3. *Previous surveys and examinations.*—A survey was made by Col. Crozet, of the Board of Public Works of Virginia, in 1839, from which a map and profile of the river was made. This survey extended from the mouth of the river to 14 miles above Sutton, a total distance of 114 miles. This was followed by several surveys for proposed railroads, which data was available in 1875, when Maj. W. P. Craighill submitted a report on examination of the river from its mouth to Sutton, 100 miles. (See Annual Report of the Chief of Engineers for 1876, pt. 2, p. 166.) Maj. Craighill's report was accompanied by one from Mr. N. H. Hutton, assistant engineer, who made a survey of the river and map at that time. Maj. Craighill's report, including Mr. Hutton's, gives a general description of the river, width, available fall per mile, mean low water, etc., as well as a description of the country and its resources. Maj. Craighill states:

> The navigation of the river might be considerably improved for batteaux such as are now used, by cutting sluices through the shoals, from 10 to 12 feet wide, and 10 to 12 inches deep at low water, for about $100,000. This is about the greatest open navigation at low water of which the river is capable.

Mr. Hutton states:

> The average fall per mile between Braxton Courthouse [2] and Charleston is about 2¼ feet. * * *
>
> The low-water volume of the river (amounting, as before stated, to about 80 cubic feet per second) is evidently entirely inadequate to supply the demands of any scheme of "open-river" navigation, for if the whole river were formed into one long sluice, extending with a uniform grade from Braxton Courthouse to Charleston, it would only form a waterway about 60 feet wide and 9 inches deep.
>
> It is true, however, that for batteau and canoe transportation (the only kind now in use) a considerable improvement might be effected by simply excavating a channel through the shoals at nearly their present grades (averaging 1 foot in 400), which would permit the formation of a waterway 10 to 15 feet wide and about 1 foot deep at low water. * * *
>
> Owing to the narrowness and curvature of the river, the method of forming fleets of coal and timber barges and rafts, as is in use in the Kanawha and Ohio, can not be practicable on this river. * * *

A second examination was made by Col. W. P. Craighill and report submitted in 1890. (See House Doc. No. 103, 51st Cong., 2d sess., and Annual Report of the Chief of Engineers for 1891, pt. 4, p. 2434.) This examination was made with a view to investigating the improvement by means of locks and dams. Col. Craighill reported that he did not consider the improvement of Elk River by locks and dams worthy of being undertaken by the United States.

A third report was made by Col. Craighill in 1894. (See Report of the Chief of Engineers for 1895, pt. 3, p. 2466.) This examination of the Elk River was made with a view of locking and damming same. Col. Craighill again reported this as unworthy of being undertaken by the Government, in which opinion the Chief of Engineers concurred.

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[1] Not printed.

[2] Now called Sutton.

A fourth report was submitted by Capt. H. F. Hodges, Corps of Engineers, in 1899 on a preliminary examination of the river from its mouth to Sutton. (See Report of the Chief of Engineers for 1900, pt. 5, p. 3392.) Capt. Hodges reported that he did not consider the river at that time worthy of any further improvement by the United States, in which opinion the division engineer concurred.

A fifth report of a preliminary examination was submitted by Capt. Wm. E. Craighill in 1903. (See Annual Report of the Chief of Engineers for 1904, pt. 3, p. 2582.) This examination was made with a view to open-river navigation. Capt. Craighill reports that in his opinion the river is not worthy of improving with a view to open-river navigation. The division engineer, Board of Engineers for Rivers and Harbors, and the Chief of Engineers all concurred in this conclusion. In all cases above all recommendations printed in the reports of the Chief of Engineers are given.

4. *Physical characteristics.*—The river from Clay to Charleston traverses through a rugged and hilly country for a distance of about 53 miles, opening out somewhat as it nears Charleston. It is a tortuous stream. Backwater from Lock and Dam No. 6, Kanawha River, extends about 3½ miles upstream, from which point to Clay the river has a drop of about 116 feet, or 2.3 feet per mile. The slope of the water is shown in detail on the drawing submitted with this report. The average width of the river from bank to bank is about 200 feet, narrowing in places to 150 feet, and with broader stretches 300 feet in width. The low-water discharge, as stated above, was estimated in 1875 to be 80 cubic feet per second. In 1894 the assistant engineer in charge estimated the discharge as 19 cubic feet per second. A reconnoissance survey of this river was made early this month. The gauge at Clay read 2 feet, and a discharge of 500 cubic feet per second was obtained at that point. At that time the depth over bars ran from three-tenths foot to 1.5 feet. As the gauge at Clay has been known to read 0.0 in extreme low water, the water must almost disappear from some bars and seep through them. The average reading for three years on the Clay gauge is 3.4 feet. The river drains only mountainous or hilly country, and hence is subject to sudden rises, which pass away rapidly. The highest reading at Clay for three years was 22½ feet. At the mouth of the river, and for some distance upstream, backwater from the Kanawha causes extreme high water, up to about 45 feet. Rises of 10 and 15 feet are common. The months of August, September, October, and November are the low-water months; January, February, March, April, and May are the high-water months; and June and July give mean stage conditions. Mean conditions indicate a depth of several feet. A study of the maps submitted will show the approximate depth at mean low water over all the bars and also the fall over them. The river has a drainage area of about 1,600 square miles, two-thirds of which lies above Clay. Except near Charleston, steep hillsides, often with rock outcroppings, impinge closely upon the water, always on one side or the other and frequently on both. Where they do not touch the river is found a bank of clay and sand, rising from 15 to 35 feet to a narrow strip of high bottom land, which rarely exceeds a few hundred feet in width. The bottom of the river

consists generally of gravel, with bowlders and outcroppings of large rock.

5. *Work already done.*—The work by the Government in the past has been directed to the improvement for push boats, large canoes, rafts, and loose logs. It consisted mainly in making channels through shoals by removing bowlders and gravel, building side or guiding walls over the shoals, either of loose stone or stone and timber, building stone and timber dikes to cut off side channels, placing and removing large stones, and removing snags and overhanging trees. About $30,000 was spent in this work between the mouth and Addison, a distance of 139 miles, and it was thought that the old method of navigation had been materially benefited. Practically all of this work was done between 1878 and 1894, and that portion of the river between its mouth and Clay received its proportion of the work. The Chief of Engineers' reports indicate that about 2 feet depth on the shoals was obtained by this improvement. In the meantime the work has deteriorated until depths are maintained as indicated in paragraph 4 above. There were some dams of various kinds on this river in early days, but these were not built by the United States and are all gone.

6. *Original method of transportation.*—To explain the improvement it is necessary to explain to some extent the rather peculiar method of transporting supplies in vogue on the Elk River. This was done by large canoes and later by so-called push boats. These canoes were 60 feet in length, made of a single poplar log, and were broad enough to roll a barrel of flour almost the entire length. They were nicely hewed inside and out, with their ends cut to shape, and sticking high out of the water. They were propelled either by an oar and paddle or with pike poles. A good deal of traffic was carried on by these canoes and push boats, and their capacity was as great as 2 tons or over. The timber was all floated out, either on rafts or by drifting the loose logs, which were caught by a boom. On one occasion a small steamboat was known to go 21 miles up the river on a rise and bring out staves on small barges.

7. *Obstructions.*—There are no dams on this portion of the river. The following is a list of the bridges, with their channel span and clearance, given in order, beginning at the mouth of the river:

(1) Virginia Street Bridge. Channel span 220 feet center to center, 41.5 feet clear height above low water.

(2) Lovell Street Bridge. Channel span 220.25 feet center to center of piers, 41.4 feet clear height above low water.

(3) Old Kanawha & Michigan Railway bridge. Channel span 209 feet center to center of piers, 40.4 feet clear height above low water.

(4) Kanawha & Michigan Railway bridge. Channel span 210 feet center to center o piers, 41.2 feet clear height above low water.

(5) Spring Street Bridge at Charleston. Channel span 273.6 feet center to center of piers, 41.8 feet clear height above low water.

(6) Railroad bridge at Bluecreek. Channel span 200 feet center to center of piers, 33 feet clear height above low water.

(7) County bridge at Clendennin. Channel span 150 feet center to center of piers, 37.6 feet clear height above low water.

(8) Yankee Dam Bridge. Channel span 177 feet center to center of piers, 27 feet clear height above low water.

(9) County bridge at Clay. Channel 241 feet center to center of piers, 33.66 feet clear height above low water.

8. *Transportation facilities.*—At Charleston are ample transportation facilities, including the Kanawha River, which is improved by means of locks and dams. The Kanawha & West Virginia Railroad runs from the mouth of the river to a little above mile 14, along the north bank, crossing the river at this point, and runs off to the southeast. The Coal & Coke Railway runs along the south or left bank from Charleston upstream for about 100 miles.

9. *Commerce.*—The following table of commercial statistics of the Elk River is copied from the Report of the Chief of Engineers for 1895, part 3, page 2461:

Commercial Statistics for Elk River, W. Va.

Year.	Saw logs and lumber.	Railroad ties, oak.	Staves, oak.	Hoop poles.	Hickory spokes.	Tan bark.	Tonnage of timber products.
	Feet b. m.					*Cords.*	*Tons.*
1883	5,200,000	100,000	898,334	....	....	....	24,790
1884	5,975,000	125,000	1,122,500	....	....	....	30,700
1885	5,100,000	250,000	1,433,750	....	....	....	33,500
1886	15,361,000	250,000	1,845,000	....	....	....	68,510
1888	15,900,000	330,000	1,210,000	....	....	....	71,150
1889	15,750,000	295,000	1,600,000	500,000	350,000	....	70,200
1890	26,650,000	330,000	1,380,000	150,000	568,000	300	89,880
1891	27,995,000	412,500	800,000	125,000	200,000	500	103,700
1892	44,400,000	380,000	1,405,000	....	....	240	139,800
1893	37,516,000	353,000	1,390,000	....	....	612	125,400
1894	21,844,000	302,000	900,000	....	....	800	92,630
1895	31,160,000	280,000	1,662,000	230,000	....	1,800	112,100

Capt. H. F. Hodges in 1900 reported that the push-boat and lumber business on the river is declining every year. At the present time practically all of the lumber shipments go to one concern, and one railroad gets all the ties which come down the river. There are about 1,000,000 feet b. m. of lumber in logging and about 35,000 crossties brought down the river. These are all floated down and constitute practically the entire commerce of the river at the present day. The logs and ties are floated down in time of rises which occur as indicated in paragraph 4. There is no special season for other commerce, if any were developed.

10. *Possible increase in commerce.*—Any increase in commerce must be based on the improvement of the river with locks and dams. The timber close to the river has about all been cut out, and it has been found that the timber inland can be handled to better advantage by sawing in the woods and shipping the manufactured lumber by rail, and I do not think any improvement to the river would divert this traffic which, however, is on the decline, as the timber is being cut very rapidly. Within the past year an extensive oil and gas territory has been developed in the vicinity of Blue Creek, about 14 miles above the mouth of the river, but as both products are transported in pipe lines or tank cars, they would not add much commerce except such as would originate from supplies and provisions required to drill and operate the wells for a limited number of years. As for general merchandise, farm products, and general supplies or products of the valley, they would be very small and in all probability would move largely by rail. The population of Elk Valley has increased within recent years, but it is by no means thickly inhabited. The only towns on this portion of the river are Clay, with a population of 550,

and Clendennin, with a population of about 1,000, and at the mouth of the river is Charleston with a population of about 25,000. The only other places have a population of about 100, or less. The two counties through which this portion of the river flows are Clay and Kanawha. Clay County has a population of 10,233 and Kanawha County has a population of 81,457, but Kanawha County as a whole would be very little affected by the improvement of this river. The valley is too narrow for extensive farming, although there are some fairly good hill farms back from the river and on tributary streams. The valley is not, at present, even self-sustaining on food products. There is coal in the valley of the Elk, the transportation of which is the only argument for undertaking the improvement of the river.

11. *Coal.*—Mr. Thomas E. Jeffries, assistant engineer, in local charge of this river, was with the party that made the survey of this river in 1875, and has lived in close touch with the river since that date. He reports as follows:

> An article on the Elk coal field and its coals, furnished by the Charleston Chamber of Commerce, will be found in the Report of the Chief of Engineers for 1904, part 3, page 2585. My opinion at this time is that this is an exaggerated account of this coal field and, as a matter of fact, the Elk River coal field has been and will be disappointing to those who work it. I have consulted with several engineers familiar with the locality, and they say that the measures when found on Elk are very much inferior to the same measures on the Kanawha River, the seams being thin and broken up with seams of slate. At the present time there are five mines operating at and below Clay: The Elliott Splint Coal Co. at Clay, The Elk River Coal & Lumber Association at Clay, Queen Shoals Coal & Lumber Co. at Queen Shoals, Elk Manor Coal Co. at Dorfee, Steele & Payne Co. at Turner.
>
> The first-mentioned mine is a new operation. The second has a fairly good showing about 20 miles up Buffalo Creek. The company at Queen Shoals mined out one vein, but have an opening at a new place. The other two mines are not extensive shippers. The Penn Mar Co. at Bream and Graham Mines at Big Chimney struck faults or mined out and quit business.

The article by the chamber of commerce, referred to above, is in part as follows:

> The dip of the strata from Charleston to a point near Sutton is almost at right angles with the stream, the latter lying almost on the "strike" of the strata. Ascending the stream from Sutton to Addison, the dip of the strata is practically with the flow of the stream. Between Addison and the headwaters of the stream, or the "divide" between the Elk shed and the Tygarts Valley, the river flows about as over the first section, nearly on the "strike" of the strata. Between Sutton and Charleston, or the first section of the field referred to, the river practically flows and has its bed in the strata, dividing the middle or Kanawha measures from the upper measures.
>
> The tributaries entering the river from the south practically flow in the direction of the dip. The descent of these tributaries, as they cut through the various formations, is not as rapid or as great as the dip of the strata. This condition prevails practically between Charleston and Addison.
>
> The upper measures, or those bearing the upper coals, appear in the immediate vicinity of the river, as the river lies at their base, while the various strata of the middle or Kanawha measures, bearing the various seams of these measures, appear above the water level as you ascend the streams to the right or in a southeasterly direction.
>
> Comprehensively speaking, you may say that all of the Kanawha coals appear in fine workable condition in this coal basin. In addition to the Kanawha coals, properly speaking, there is a very superior cannel coal on Mill Creek and on Falling Rock Creek of Elk River. Both of these cannel coals are now operated, and the coal both from the Mill Creek operation and the Falling Rock Creek operation find ready sale in the markets of the East, North, and West. We will not particularize by mentioning the coals found on the different creeks except to say that on Blue Creek, a tributary entering the river 12 miles above Charleston, the lower coals of the upper measures and the upper coals of the middle measures of workable thickness and superior quality appear above the drainage of the stream, as shown from the numerous exposures or openings. We mention this to show that ascending the river valley from Blue Creek at the point

where it is joined by the valley of Birch River, 18 miles below Sutton, the same conditions practically prevail as regards the coals in their dip or inclination.

On Birch River all of the coal seams of the Kanawha measures down to and including the Clarion or Wyant seam, appear above the drainage of the stream, as shown by numerous openings, including in their list the finest bituminous, splint, and coking coal of these measures. The coals of the upper measures, including the No. 5, the North Coalburg or Brush Creek, and other seams above the latter, appear in large areas. These are usually high-grade splint coals. The coal seams along this stream attain in nearly every instance workable thickness; in some instances they are of an ideal thickness for working.

"On the north side of the Elk, in the vicinity of the river, the seams of the upper measures only appear above the drainage. Recent borings of this territory show the Pittsburg seams at a fine workable thickness and of superior quality in the vicinity of Big Otter and O'Briens Creek. The Pittsburg seam attains a thickness of between 5 and 6 feet on the north side of the river in the vicinity of Frametown, and from 4 to 6 feet at Big Otter and O'Briens Creek. These last streams would be reached by the river improvement to Clay.

In the section of the watershed or coal field between Sutton and Addison, the river crosses, as mentioned heretofore, from its southerly to its northerly position in the basin, flowing practically with the dip of the strata and cutting through the formations of the middle or Kanawha measures and the upper portions of the New River measures, cutting through the great conglomerate or Falls Rock or Rogers No. XII at a point 17 miles above Sutton, bringing the strata bearing the New River coals above the drainage from the latter point to the head of the stream.

The first or upper seam of the New River coals, known as the "Nuttalburg," appears at a point 2½ miles above Addison and extends 16 to 18 miles farther up the stream at an elevation of between 400 to 500 feet above the water surface of the river. This seam, which is the very finest coking coal, attains a thickness of from 5 to 5½ feet.

Returning again to the section of the stream between Sutton and Addison, we find in the northern portion of this section the upper coals of the Kanawha measures, notably the "Lewiston" and "Coalburg" seams of coal, attaining nice workable thickness and quality over large areas.

We wish to say in effect that on the river front, as well as on each one of the large creeks from Mill Creek, 7 miles above the mouth of the river, to the head of the river, are found splendid deposits of these coals. The creeks, in almost every instance, are easy of access by railroad or tramroad, and the coals mined thereon can, in almost every instance, be conveyed to the river in the most economical manner and dumped into the barges. Out of this estimate has been largely omitted the great Roane County field, where at 400 feet the Pittsburg vein shows a splendid development. Recent developments by drill on Big Buffalo Creek and O'Briens Creek, both of which can be easily reached by water transportation, show splendid developments of the Pittsburg seam and of the lower beds at less than 100 feet below the surface.

The actual operations of producing coal on Elk River, by reason of want of transportation, are comparatively small. As you ascend the valley of the Elk from Charleston, the first operation is the Mill Creek Cannel Coal Co., which has been mentioned above; the next is the operation of mining the splint coals at Masons, 7½ miles above Charleston. This is the No. 5 of Kanawha Valley, and has a thickness, including partings, of 5 or 6 feet. Above this on Falling Rock Creek, 17 miles above Charleston, is the Falling Rock Cannel Coal Co., of which mention has been made above.

At Morris Creek and also Queen shoals in the first section of the basin described, a bed or seam of coal, known as the North Coalburg in the upper measure, is being extensively mined and shipped to the markets of the north and west, where as a fine domestic coal it is in great demand. It is also valued highly as a steam coal. The analysis of the coals from this bed show about 26 to 28 per cent of fixed carbon. The coal yields about 1,200 pounds of coke to the ton (2,000 pounds) of coal mined, which is about the average yield of the latter product from the Kanawha coals. Preparations are being made for the mining of coals from Falling Rock Creek, and this extensive operation has only been delayed for the want of transportation facilities. From the valley of Big Sandy, 20 miles above Charleston, to the head of the river on the western side of the Elk River, there are splendid deposits of steam, domestic, and gas coals, which it is not possible to touch by reason of the railroad not being on that side of the river. The total area of the Elk River shed is approximately 2,800 square miles.

In many instances, by reason of railroads to the river, coals can be mined beyond the area of this watershed. The approximate area of this shed from Charleston to Sutton is 1,700 square miles, and its area from Charleston to Big Otter, 12 miles above Clay, is practically 1,100 square miles, or about 690,000 square acres, over all of which territory the coal-bearing strata extends. In estimating the probable amount of coal area it is customary to allow for erosion about one-third of the area. Deducting, however, 50 per cent for erosion, there would remain as a safe estimate practically 350,000 acres of coal immediately tributary to the stream in the section between Charleston and Clay. This practically takes into consideration only the coals above the surface.

A prominent engineer at Charleston writes in as follows concerning coal on the Elk River:

> I will say that the coal measures along this stream from its mouth to Sutton, about 100 miles, are not in as favorable condition for development as those along the Kanawha River east of Cabin Creek, for the following reasons:
>
> The general direction of the valley of Elk for the first 100 miles is along the "strike" of the measures, and as the uppermost seams of the Kanawha measures, in their northwesterly dip approach the level of Elk River at its mouth, this condition continues as the approximate line of "strike" is followed upstream.
>
> Therefore as to drift mining, only these uppermost seams are available, and these not in the best condition as to thickness and purity for mining purposes; furthermore, the areas of these seams are somewhat limited.
>
> Between Porters Creek and Clay, however, the river for quite a distance takes a southeasterly trend, thereby cutting the measures on the "rise" and exposing the coals quite far down in the series; but even here, while the quality of the coal that may be recovered is excellent, the thinness of the measures and the many slate partings occurring in the seams themselves, place these coals out of the markets for some time to come, except at a few points.
>
> As to the coal that may be found below drainage only accessible by shafting, I find the general thinning of the measures shown in the top seams occurring in these also. At Blue Creek and for several miles above and below that point, recent drilling for oil passed through no notable coal seams, although these drill holes penetrated below the Kanawha, New River, and Pocahontas measures.
>
> For these reasons I doubt if the possible value of coal production from this valley would be commensurate with the cost of construction and maintenance of slack-water navigation on this stream, even if the river itself proves well adapted to it.

Drawing K14/6 shows the line of the northern limit of the Allegheny-Kanawha coal area, which is the only commercial coal along the Elk River shown on the map of the West Virginia State Geological Survey dated 1910, except some very Small areas of Pittsburgh coal to the north of the river. It will be noticed that this line extends from Charleston along the river for a distance of about 22 miles, after which the line of the northern limit continues straight ahead, while the river as you ascend it breaks away in a southern direction and enters farther into the coal area. This line of northern limit extends in a southwesterly direction all the way across the valley of the Kanawha, and coal is found to the south of this line throughout the valley of the Kanawha and Coal Rivers. Cabin Creek referred to in the letter quoted above is on the Kanawha River in the heart of this coal region.

12. *Improvement desired.*—Apparently the only form of improvement desired is slackwater. No special depth is asked for. Circulars were sent to prominent citizens of the vicinity, who might be interested in the improvement, and published in the two leading papers of Charleston, but they failed to excite much interest and met with little response. A number of the responses were obtained only after a second request for some reply. The following are quotations from letters received:

> In our opinion the amount of freight that would be shipped up Elk River by boat would not justify putting in locks and dams.
>
> We do not think the small benefit derived from locks and dams on Elk River would justify the expenditure the Government would have to make to install them.
>
> We believe there would be some advantage shipping by water over the present method of railroad shipments.
>
> We believe that the development of Elk River would add greatly to freight facilities adjacent same.

We are of the opinion that there would be absolutely no advantage in the shipment of freight by water as against shipment by rail in the Elk River Valley, nor would it add anything to the commerce in this valley as proposed.

We do not think the advantage gained by improving Elk River with locks and dams would pay for the cost of same.

We are of the opinion that the advantage in shipping freight by water to points in Elk River would be very slight.

13. *Conclusions and recommendations.*—There is no reason for improving this stream, except to afford method of marketing the coal from the vicinity of Clay Court House. By any system of improvement it would still cost more to bring the coal out of the Elk River than it would out of the Kanawha. The river is so narrow that if coal tipples were put in and barges tied alongside, as they are on the Kanawha, it would materially interfere with the traffic. The cost of towing coal on the Kanawha River is based on the number of locks passed and a slack-water system extending only to Clay would require about 10 locks, of 12-foot lift or their equivalent, while the Kanawha River above the mouth of Elk has only 4 locks. Tows of the size used on the Kanawha would be impracticable, due to the sharp bends and the narrow channel. People on the Kanawha River are at present clammoring for a 9-foot depth, because they claim they can not compete with Pittsburgh coal unless they get this draft. The Elk coal would be less able to compete with it. The coal in the Elk River generally is not as good as that in the Kanawha, and apparently, for a considerable time to come, it would be more advantageous to develop Kanawha coal than coal in the Elk. The Coal & Coke Railroad, which is comparatively new, is able to provide for the commerce of this valley, both in coal and otherwise. It is believed that this river is not worthy of improvement by the National Government at this time and it is recommended that no survey be made.

ADDITIONAL DATA.

14. *Terminal facilities.*—There are no terminal or transfer facilities on the Elk River, except such as may be found within the limits of the city of Charleston. These consist of some hoists to transfer sand and gravel from boats to bins located on top of the bank. There are two plants of this kind, one belonging to the Elk City Sand Co., and the other to Pfaff & Smith Co. The Charleston Lumber Co. has an inclined chute for hoisting logs to their mill. All three of these plants are used only by the companies to which they belong, and are not open to the public. The Kanawha & Michigan Railroad Co. has a tie hoist for elevating cross ties from the river for loading on their cars, and it is understood it can be used by any parties desiring to ship by this railroad.

15. *Water power.*—Due to the small low-water discharge of the river, it is not believed that the subject of water power merits any consideration at this time even if locks and dams were built. Coal is very cheap in this vicinity.

16 *Other subjects.*—There are no other subjects worthy of investigation or report in connection with this subject at this time.

F. W. ALTSTAETTER.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
November 29, 1912

TO CHIEF OF ENGINEERS:

I concur in the views of the district office.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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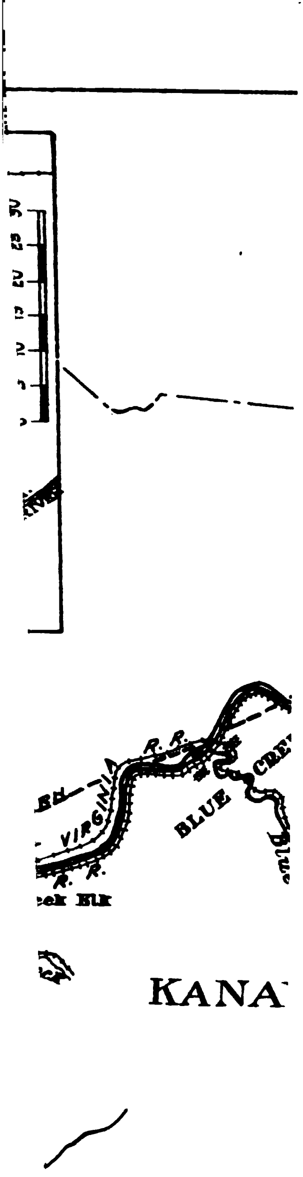
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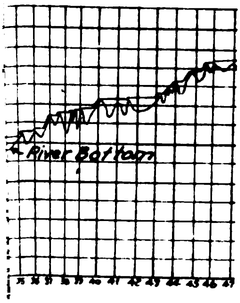
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62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1386.

YOUNGS BAY AND RIVER, OREG.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF YOUNGS BAY AND RIVER, OREG.

FEBRUARY 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 10, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 6th instant, together with copy of a report from Maj. J. F. McIndoe, Corps of Engineers, dated December 6, 1912, on preliminary examination of Youngs Bay and River, Oreg., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 6, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Youngs Bay and River, Oreg.

1. There is submitted herewith, for transmission to Congress, report dated December 6, 1912, by Maj. J. F. McIndoe, Corps of Engineers, on preliminary examination of Youngs Bay and River, Oreg., called for by the river and harbor act approved July 25, 1912.

2. Youngs River rises in the northwestern part of Oregon and flows in a northwesterly direction for a distance of about 20 miles, emptying into Youngs Bay, which is on the Columbia River, about 9 miles above its mouth. About 6 miles above the bay the Klaskanine joins Youngs River. The head of navigation on the Klaskanine branch is at the small town of Olney, and on the Youngs River branch navigation practically ends at the log booms located about one-half mile above the forks. Any vessel which can cross the ocean bar of the Columbia River can reach the mouth of this bay. Thence at low water 9 feet can be carried to the head of the bay and 4 feet to the forks of the river and 3 feet to Olney. Below the fork the channel depths vary from 4 to 37 feet, and the range of tide over this section is about 7 feet.

3. The district officer states that only one boat is now regularly engaged in carrying general freight and passengers on the river, this being a gasoline launch about 50 feet long and drawing about 4½ feet. This boat makes one trip a day from Astoria to Olney and return, and her traffic is reported to amount to about 1,200 tons per annum. Occasionally a stern-wheel boat takes in a load of hay for use on the dairy ranches, which occupy the land from which the timber has been removed. The only other boats which enter Youngs River are the towboats engaged in bringing out log rafts. While the systematic development of the shores has been planned by local interests, there is little or no evidence of the execution of these plans, and no offers of cooperation in the work of improvement have been made by these interests. The navigation facilities available appear to be adequate for the present and prospective demands of commerce, and the district officer expresses the opinion that the improvement of the locality is not worthy of being undertaken by the General Government at this time. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress I report that the improvement by the United States of Youngs Bay and River, Oreg., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. Youngs Bay is located on the Oregon shore of the Columbia River, 9 miles from its mouth, adjacent to the city of Astoria. Youngs River empties into the bay. About 6 miles from the mouth the river is joined by the Klaskanine, its principal tributary. The small town of Olney, located about 1½ miles above the forks, on the Klaskanine, is the head of navigation on that stream, and the Bremner Logging Co.'s booms, about one-half mile above the forks, is the head of navigation on Youngs River. The available channel depth at low water in the bay is about 9 feet and in the river 3 feet, the range of tide being about 7 feet in the bay and 6 feet in the river at Olney.

2. The principal source of commerce is in the timber adjacent to these streams and, after its removal, in dairy products. One boat drawing about 4½ feet operates regularly between Astoria and Olney, and it is estimated carries about 1,200 tons of freight. Other boats tow out log rafts. There are no mills on the bay or on the rivers. Sailing vessels use the upper bay to some extent for anchorage. The improvement desired is said to be a channel 25 feet deep at low tide through the bay for a distance of about 2½ miles from deep water in Columbia River. The district officer expresses the opinion, in which the division engineer concurs, that the existing channel in Youngs Bay and River is ample for present and prospective commerce, and any further improvement of the locality is not worthy of being undertaken by the General Government at this time.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, and one communication has been received and given consideration.

4. From the facts presented, it appears there is no commerce present or prospective, that can not be reasonably well accommodated on the present depth in Youngs Bay and River. There are no commercial or mining industries to create a large commerce, and there is no apparent need of better facilities than now exist. The board therefore concurs with the district officer and the division engineer in reporting that in its opinion it is not advisable for the United States to undertake the improvement of Youngs Bay and River at this time.

5. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF YOUNGS BAY AND RIVER, OREG.

UNITED STATES ENGINEER OFFICE,
Portland, Oreg., December 6, 1912.

From: Maj. J. F. McIndoe.
To: The Chief of Engineers (through the division engineer, North Pacific Division).
Subject: Preliminary examination of Youngs Bay and River, Oreg.

In compliance with department letters of August 3 and September 24, 1912, the following report is submitted on the preliminary examination of Youngs Bay and River, Oreg., provided for in the river and harbor act approved July 25, 1912.

Youngs Bay is located on the Oregon shore of the Columbia River, about 9 miles from its mouth. It is 3 miles across at its widest part and extends back from the general line of the river about the same distance. It is about 1½ miles wide where crossed by the railway bridge. The water is shallow over the greater part. The channel from deep water in the Columbia to deep water at the head of the bay has depths of from 9 to 14 feet over a distance of 2½ miles, and over the remainder of the bay the depths probably range from 3 to 8 feet at low water. Average rise of tide is 7 feet. The bottom is composed principally of silt and sand. Its banks on the south and west sides are low and swampy. On the east there is the high rocky peninsula on which the city of Astoria is built. Its mouth opens to the north. In location it is well protected from prevailing storms. The two most considerable streams that empty into the bay are Youngs River and Lewis and Clarke River.

There are two bridges across Youngs Bay, the railroad bridge and the county wagon bridge. Both of these are pile trestles with steel draws. Railroad bridge has two clear openings, 130 feet, bottom chord about 20 feet above mean low water. County bridge has two clear openings, 120 feet, bottom chord about 20 feet above mean low water.

Youngs River rises in the Coast Mountains about the center of Clatsop County in the northwestern part of Oregon, flows in a northwesterly direction and empties into Youngs Bay. The total length of the stream is about 20 miles. About 6 miles above the bay the Klaskanine joins Youngs River. The two branches are of about equal size. The head of navigation on Klaskanine branch is at the small town of Olney where the county road to Astoria crosses the river. On Youngs River navigation practically ends at the log booms of the Bremner Logging Co., about one-half mile above the forks. The streams above the forks for about 2 miles are about 100 to 200 feet wide, with depths varying from 3 to 11 feet at low water. The range of tide at Olney is about 6 feet. Several snags are in evidence. Bottom is mud and banks tide lands.

Below the forks, Youngs River gradually widens from about 200 to 1,200 feet where it joins the bay. The depths vary from 4 feet on the bar about 2 miles below the forks to 37 feet at the head of the bay. The range of tide over this section of the river is about 7 feet. The channel is practically free from all obstructions. Bottom is fine silt and mud; banks tide lands.

A map is submitted herewith showing the river and bay. The shore line is taken from the map submitted with an examination report of the river prepared in 1881. No material changes have taken place since that examination was made; the islands and sloughs, as well as the depths, are in general about the same to-day.

There are generally freshets of short duration during the winter months on both Youngs and Klaskanine Rivers. These affect the stream principally above the forks where they sometimes overflow the banks at an elevation of about 10 feet above low water. These freshets do not carry much silt, the upper reaches being rocky and heavily timbered.

The country contiguous to Youngs and Klaskanine Rivers is, when the timber is removed, essentially a dairying country. There are about 50 ranches in the valley, nearly all engaged in dairying. From most of these the cream and milk is taken by wagons over the country roads. The principal wealth of the country lies in the tributary timber, which is estimated at 10 to 15 billion feet. The Western Cooperage Co. is operating 4 or 5 miles of logging railroad up the Klaskanine, and, together with the Bremner Logging Co. sends out perhaps 20,000,000 feet b. m. of logs, valued at about $160,000, per annum.

It is believed that the commerce on Youngs River and Bay will consist of timber for many years. Cereal crops are not raised to any extent, as it is claimed climatic conditions are not suitable. Most of the farmers travel the country roads to Astoria, as they are about 4 miles shorter than the river and bay route.

The traffic in general freight and produce continues fairly regular throughout the year. Occasionally a stern-wheel boat takes in a load of hay late in the fall for use of dairy ranches for winter feed. The only boat now engaged in carrying general freight, dairy products, and passengers up Youngs River is the gasoline launch *Teddy Roosevelt*. She is about 50 feet long and draws about 4½ feet. This boat makes one trip a day from Astoria to Olney and return, and carries, so the captain estimates, about 100 tons of freight in a month, 1,200 tons per annum. The only other boats which enter Youngs Bay and River are the towboats engaged in towing out logs from the booms of the Western Cooperage Co. and Bremner Logging Co. These boats take out one or two rafts a week, going in on the flood and coming out on the ebb tide. The tides would probably be used to a great extent even with a greater depth over the bar a short distance below the booms. On reaching the bay the rafts are held to await the flood tide before towing up the Columbia to the mills.

No mills or factories are located on these waters, although it is possible and probable that some mills would be built on the bay should a deep-water channel be provided across the shallow water in Youngs Bay. The depth of the channel is now sufficient for present needs. In this connection reference is invited to the remarks of the Astoria Chamber of Commerce in a letter[1] dated October 24, 1912, herewith.

Sailing vessels of the Alaska fishing fleet use the upper end of Youngs Bay for anchorage when out of commission during the winter months. Two were anchored there at date of examination.

Besides the small wharf at Olney and two or three farmers' landings, there are no wharves or docks located on Youngs Bay or River. There is no public space available for docks, and under present conditions none are needed.

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[1] Not printed.

In connection with the establishment of harbor lines at Astoria Harbor, the Acting Secretary of War, on April 22, 1891, approved harbor lines in Youngs Bay and in the lower portions of Youngs and Lewis and Clark River as recommended by a board of engineer officers, whose report is printed on page 3388, Annual Report of the Chief of Engineers for 1891.

The only water power in the vicinity is at the falls on Youngs River above the head of navigation, where the Willamette Pulp & Paper Co. has had a pulp mill for over 20 years. The mill has not been operated for a long time.

In compliance with the act of March 3, 1881, an examination was made of Youngs, Lewis and Clark, and Skipanon Rivers, entering into Youngs Bay, in the county of Clatsop, near mouth of Columbia River, Oreg., and the report is printed in Senate Document No. 112, Forty-seventh Congress, first session.

In compliance with the act of August 11, 1888, an examination and survey were made of Youngs River and its tributary Klaskuine River (Klaskanine River), and the report, with map, is printed in House Document No. 69, Fifty-first Congress, first session. The report was favorable to improvement to the extent of removing snags and sunken logs at an estimated cost of $1,650. The act of September 19, 1890, contained the following appropriation: Improving Youngs and Klaskuine Rivers in Oregon: To complete, $1,600. About $1,200 of this amount was expended during the winter of 1890 in removing snags, sunken logs, and overhanging trees as far up as the lower end of the cut-off, a distance of 7 miles, and also from the channel of the Klaskuine as far up as Kamms Wharf, a distance of about 2 miles. The balance was expended during the fiscal year ending June 30, 1896, in completing the improvement, and no further appropriation was recommended.

The act of September 19, 1890, also called for an examination of Youngs Bay channel from the ship channel of the Columbia River to the head of Youngs Bay, a distance of 1½ miles, with a view to improving same by dredging, so as to secure a depth of 18 feet at low tide. The report is printed in House Document No. 67, Fifty-first Congress, second session. I fully concur in the following remarks of the district officer, Maj. Thomas H. Handbury, who made the report, the conditions remaining practically the same as they were 22 years ago:

> Should the exigencies of commerce in this vicinity ever be such as to justify the necessary expense, a safe and convenient harbor of considerable magnitude can be made in these waters. At present the commerce of the locality is well served by vessels of a draft suitable to the present depths of water in the bay. There are no manufacturing establishments in the vicinity or natural products of the soil or evidence of outlay by private individuals that would seem to justify that the General Government expend here so large an amount of money as the dredging of this channel would involve. A large extent of the country in this vicinity, even to the hilltops, is laid out in town sites, and on paper these are liberally supplied with railroads, terminal facilities, dry docks, and other appliances necessary to the handling of a large and widely extended commerce. On the ground, however, I find no tangible evidences that capitalists of means have been induced to take hold of these enterprises. Until there is such evidences it is believed the prospective commerce of the locality will not justify the expenditure.

It appears that the item calling for this examination was inserted in the act at the request of the Representative in Congress from the district concerned with a view to securing a 25-foot channel at low tide from the Columbia River up to a point where the center line of sections 17 and 20, township 8 north, range 9 west, Willamette meridian, Oregon, crosses Youngs River. Reference to accompanying map will show that at this point the narrows of Youngs River or the head of Youngs Bay, there is at the present time a low-water depth of 29 feet, but that in the channel from the Columbia River through the bay for a distance of 2½ miles the depth is only from 9 to 14 feet. Manifestly to secure a channel 25 feet deep through the bay from the Columbia River would necessitate the removal of a large quantity of material.

The waterway has no water power capable of development in connection with its improvement for navigation, and while a large area of tide land could be reclaimed back of the established harbor lines by material dredged in deepening the channel, and it is probable that lumber and other wood manufacturing plants might be located on the bay if a deeper channel were provided, a project for a deeper channel should receive no further consideration without substantial cooperation on the part of local interests. A town-site company and a water front company have published prospectuses, with maps, showing extensive railroad water terminals and docks on both sides of Youngs Bay, but this office has been unable to secure any expression of a desire on the part of the property owners or of local commercial bodies to share with the United States the expense of any improvement.

In my opinion the existing channel in Youngs Bay and River is ample for the present and prospective demands of commerce, and any further improvement of the locality is not worthy of being undertaken by the General Government at this time.

J. F. McIndoe,
Major, Corps of Engineers.

[First indorsement.]

United States Engineer Office,
Northern Pacific Division,
San Francisco, Cal., December 9, 1912.

To the Chief of Engineers, United States Army:

Concurring in the views expressed by the district officer.

Thos. H. Rees,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1387.

NARROWS OF LAKE CHAMPLAIN, N. Y. AND VT.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF NARROWS OF LAKE CHAMPLAIN, N. Y. AND VT.

February 11, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

War Department,
Washington, February 10, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copies of reports from Col. W. M. Black, Corps of Engineers, on preliminary examination and survey, respectively, of Narrows of Lake Champlain, N. Y. and Vt., made by him in compliance with the provisions of the river and harbor act approved June 25, 1910.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 10, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on examination and survey of Narrows of Lake Champlain, N. Y. and Vt.

1. There are submitted herewith for transmission to Congress reports dated May 19, 1911, and November 25, 1912, with maps, by Col. W. M. Black, Corps of Engineers, on preliminary examination

and survey, respectively, of Narrows of Lake Champlain, N. Y. and Vt., called for by the river and harbor act approved June 25, 1910.

2. The present project for the improvement of the Narrows of Lake Champlain, adopted in 1899, provides for the widening of the channel and restoration of the depth to 12 feet at low water, and the placing of fenders at certain points to protect barges from collision with the rocky banks of the channel. This project was completed in 1905, and subsequent expenditures have been applied to maintenance. To adapt this channel to the boats which will use it upon completion of the enlarged Champlain Canal and communicating waterways the district officer submits, with favorable recommendation, a project providing for a channel 12 feet deep and 200 feet wide, except at one point through rock where the width is reduced to 150 feet. The estimated cost of this plan, including the placing of new fender booms, is $737,000, and $5,000 annually for maintenance.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of February 6, 1913, concurring generally with the views of the district officer. The board is not satisfied that the cut-offs at Maple Bend and Chilton Bend may not be omitted without serious inconvenience to navigation and with a very material reduction in cost. If the improvement be adopted by Congress further study of this part of the channel should be made before the work is undertaken.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore in carrying out the instructions of Congress I report as follows: That the improvement by the United States of the Narrows of Lake Champlain, N. Y. and Vt., is deemed advisable so far as to secure an available channel depth of 12 feet with a general width of 200 feet on the bottom, at an estimated cost of $737,000 for first construction and $5,000 annually for maintenance, these estimates being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of $300,000 with contract authorization for the balance of the estimate, with a view to completing the work in three years and authority for the construction of a dredge if reasonable contract prices can not be obtained.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
February 6, 1913.

To the Chief of Engineers, United States Army.

1. After a detailed study of physical and commercial conditions, the district officer concludes that the requirements of commerce and navigation will ultimately demand a waterway having a width of 400 feet and a depth of 14 feet, but for the present and immediate future

a width of 200 feet and depth of 12 feet will suffice, and a project for those dimensions is favorably recommended by the district officer, who is also division engineer. At one point between Putts Rock and Putts Leap it is found impracticable to give the full width, and it is there made 150 feet. Timber fenders are provided at several places to protect vessels from injury against the rocky shores. Cut-offs are proposed at the Elbow, at Chiltons Bend, and at Maple Bend.

2. The principal items of work to be done is dredging, and the estimates given are on the basis of the Government constructing and operating a dredge, provided suitable contract prices can not be obtained.

3. **Estimated cost:**

Excavating 5,000,000 cubic yards of soft material, at $0.125 per cubic yard place measurement	$625,000
Purchase of land	35,000
Clearing and grubbing	1,500
Placing new fender booms	10,000
Engineering and contingencies	65,500
Total	737,000
Annual cost of maintenance	5,000

4. The district officer concludes with the following recapitulation:

(1) That all work should be designed to fit ultimately a project providing a width of 400 feet, a depth of 14 feet, and no bad curves.

(2) That a 200 feet project with 12 feet depth is advisable, justifiable, and requisite at this time, and such a project is presented and recommended for adoption at an estimated cost of $737,000.

(3) That this project can and should be completed in three years, and an initial appropriation of $300,000 is requisite with continuing contract authorization for the balance of the project.

(4) That the work should be done under one contract or by Government plant, depending upon prices received on competitive bidding.

5. The commerce of the Narrows for the calendar year 1911 is stated to have been 825,975 tons, of which 681,894 tons passed through the Champlain Canal. It seems but reasonable to anticipate a very material increase in commerce as soon as the enlargement of the canal has been completed, and vessels of adequate size, such as are expected to use the canal in the future, have been put in service.

6. The improvement proposed by the district officer is designed to afford needed facilities through this important link in the waterway connecting Lake Champlain with the canal system of the State of New York. If left in its present condition it would be obstructive to the free and full development of the commerce that is hoped will result from the large expenditures being made by the State.

7. The board concurs in the views of the district officer that it is advisable for the United States to undertake the improvement of the Narrows of Lake Champlain so far as to provide a channel 12 feet in depth and generally 200 feet in bottom width, practically in accordance with the project proposed by the district officer and which he estimates will cost $737,000, and $5,000 annually for maintenance. The board, however, is not satisfied that the cut-offs at Maple Bend and Chilton Bend may not be omitted without serious inconvenience to navigation and with a very material reduction in cost, and recommends that a further study be made of the proposed channel at these localities. The board concurs in recommending authorization for

the construction of a dredge if suitable contract prices can not be obtained, and in the recommendation for an initial appropriation of $300,000 and contract authorization for the balance of the estimate, with a view to completing the work in three years.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

REPORT ON PRELIMINARY EXAMINATION OF NARROWS OF LAKE CHAMPLAIN, N. Y. AND VT.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
New York, N. Y., May 19, 1911.

1. Respectfully forwarded to the Chief of Engineers, United States Army, inviting attention to the within report on preliminary examination of the Narrows of Lake Champlain made by Lieut. R. D. Black, Corps of Engineers, accompanied by Mr. J. H. Rostock, assistant engineer, on April 29 to May 3, 1911, in compliance with the requirement of the act approved June 25, 1910. The locality had been previously unofficially inspected by me on May 16, 1910.

2. From my personal knowledge and from the information contained in the within report, it is my belief that, as an important link in the international waterway between the Hudson and the St. Lawrence Rivers, the importance of the Narrows of Lake Champlain is great, and that the locality is worthy of improvement by the General Government to an extent greater than that contemplated under the existing project.

3. The estimated cost of the survey on which to form a project is $6,200. The sum of $4,375 was available on May 1, 1911, from earlier appropriations for work under the existing project. This amount should be expended in the maintenance of the channel under the existing project and surveys for any new project should be made from a new allotment. A map of the locality can be seen on chart No. 556, United States Coast and Geodetic Survey.

W. M. BLACK,
Colonel, Corps of Engineers.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, June 5, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The existing project for the improvement of the Narrows of Lake Champlain, adopted in 1899, provides for the widening of the channel and restoration of the depth to 12 feet at low water at five

shoals and the placing of fenders at certain points to protect barges from collision with the rocky banks of the channel, at an estimated cost of $22,500. The sum of $24,615 has been expended under this project, and as $63,500 was expended under a former project, the total expenditures have been $88,115. The existing project was reported as completed in 1906, but it appears that shoaling has taken place at different times at almost all of the points which have been improved and that the channel is not at present in the condition contemplated under the project.

3. The engineer officer who made the local examination reports that improvements which are urgently needed are to remove the sharp bend at the "Elbow," install new fender booms, and dredge a channel 150 feet wide and 12 feet deep at low lake level through the shoals in the harbor of Whitehall and between Whitehall and Bensons Landing. The banks in the vicinity of the "Elbow" are composed of rock, and the problem of providing a suitable navigable passage at this point is one requiring further careful study, based on more precise data than are now available.

4. The report shows that while a considerable commercial tonnage originates at points on Lake Champlain, only about 10 per cent is transported by water. The principal reasons assigned for this and for the small through tonnage are the lack of suitable terminal facilities, including mechanical appliances for loading and unloading, the refusal of railroads to prorate or issue through bills of lading on shipments via rail and water, the insecurity and inadequacy of the existing channel through the lake, resulting in high insurance charges, and the insufficient navigation afforded by connecting canals through which the commerce must pass to its destination. With the completion of the new Champlain Barge Canal, which is expected by 1913, the facilities for an efficient through navigation will be vastly improved. Having in mind, also, the expensive State and local projects for the establishment of suitable terminal and transfer facilities at points along the barge canal and at the principal towns of Lake Champlain, it will be seen that conditions will be so transformed that the past commerce through the lake will no longer serve as a criterion by which to judge the future traffic. That the commerce of the lake will increase there seems no reason to doubt, provided a channel is available which can be safely navigated by boats of the class which will use the connecting waterways.

5. The district officer, who is also the division engineer, believes that, as an important link in the international waterway between the Hudson and the St. Lawrence Rivers, the importance of the Narrows of Lake Champlain is great, and that the locality is worthy of improvement by the General Government to an extent greater than that contemplated under the existing project. A survey, estimated to cost $6,200, is recommended by him. The board concurs with the district officer in the opinion that some further work is advisable at this locality, and it recommends the authorization of a survey to determine the extent and cost of justifiable improvement.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, June 14, 1911.

1. Respectfully submitted to the Secretary of War.

2. This is a report on preliminary examination of the Narrows of Lake Champlain, N. Y. and Vt., authorized by the river and harbor act of June 25, 1910.

3. Inviting attention to the report of the Board of Engineers for Rivers and Harbors in the preceding indorsement, I recommend that a survey of the locality as proposed be authorized.

EDW. BURR,
Acting Chief of Engineers.

[Fifth indorsement.]

WAR DEPARTMENT, *June 15, 1911.*

Approved as recommended by the Acting Chief of Engineers.

ROBERT SHAW OLIVER,
Assistant Secretary of War.

REPORT OF LIEUT. R. D. BLACK, CORPS OF ENGINEERS, ON PRELIMINARY EXAMINATION OF NARROWS OF LAKE CHAMPLAIN, N. Y. AND VT.

UNITED STATES ENGINEER OFFICE,
Albany, N. Y., May 13, 1911.

SIR: In compliance with instructions contained in your letter of April 26, 1911, I have the honor to submit the following report of an inspection and examination of the Narrows of Lake Champlain, N. Y. and Vt., incidental to the rendering of the report on the preliminary examination of this waterway required by the river and harbor act approved June 25, 1910.

2. My inspection and examination were made between April 28 and May 4, 1911. They comprised a personal inspection of the Narrows and the collection, by conversation and correspondence and collaboration, of all pertinent information obtainable in the time and with the facilities at my disposal.

I. GEOGRAPHICAL LOCATION.

3. Within the meaning of the river and harbor act the Narrows of Lake Champlain is taken to be that portion of the lake lying between Whitehall and Crown Point, N. Y., at the upper or southern end of the "Broad Lake." In local parlance the term "Narrows" is also specifically applied to a very contracted portion of this waterway at a point where it passes between two rocky promontories just south of Dresden Depot, on the Delaware & Hudson Railroad. Hereinafter the term when used will refer to the entire waterway except where especially mentioned as "the Narrows near Dresden."

II. History of Improvements.

4. In its original condition the southern reach of this waterway, about 15 miles long, from Whitehall north to Bensons Landing, Vt., had a narrow and tortuous channel, with a low-water depth on the shoals of from 9½ to 10 feet. The most troublesome shoals were found at a point just south of Bensons Landing, Vt., known as the Four Channels, at a point in the vicinity of the "Elbow," about 1 mile north of Whitehall, and in the harbor of Whitehall. The bottom, as developed, showed a heavy deposit of soft alluvial matter everywhere except at the "Elbow," where a rocky reef was found. The principal commerce which was to be benefited by improvement was that to and from the Champlain Canal, which enters the lake at Whitehall. This canal gave a depth of 6 feet on the miter sills, and was navigated chiefly by boats about 100 feet long, 17 feet wide, drawing 4½ feet of water, and carrying at this draft on the average about 150 tons of cargo. They were taken through the "Narrows" in tows, averaging 13 boats to the tow, and propelled by tugs drawing from 8 to 10 feet when pulling. The total commerce passing through the "Narrows" in 1883 is given as 972,300 tons.

5. The original project for improving the "Narrows," adopted in 1886, was to obtain by dredging and by a small amount of rock excavation a channel with a least width of 150 feet and a depth of 12 feet at low water from Whitehall to deep water below Bensons Landing, a distance of 15 miles. This project was extended in 1890 to include the widening and straightening of middle reaches of the channel. Under this project, as extended, the sum of $63,500 was expended and practically all of the work contemplated was completed. By the act of Congress approved March 3, 1899, the existing project was adopted. Commerce through the "Narrows" had increased so that the average number of boats in a single tow was 17, and tows of 25 boats were not infrequent. To provide for the handling of these larger tows this project contemplated the widening of the channel and restoration to a depth of 12 feet at low water at five specified localities, and the placing of fenders to protect the barges from collision with the rock banks of the channel at Puts Rock, the "Narrows" near Dresden, and Pulpit Point, at an estimated cost of $22,500. (See Annual Report of the Chief of Engineers, 1897, pp. 3302–3303.) The sum of $24,615 has been expended under this project, leaving an available balance of $4,375, which can profitably be expended during the present working season on maintaining the improvement. In the Annual Report of the Chief of Engineers for 1906 the project was reported as completed. Various reports of the Chief of Engineers, corroborated by personal observation, show that shoaling has taken place at different times at almost all of the points which have been improved and that to-day the channel is not in the condition contemplated under the project. In 1907 the total commerce of the "Narrows" was reported as 724,529 tons and in 1908 as 565,414 tons. It is believed that the decline in tonnage between 1883 and 1908 does not show unworthiness of the former projects, as might be inferred, since this decline is due to other conditions to be discussed later, which probably would have caused a far greater decline had it not been for the improvements which have been carried out. The benefit derived from these improvements has been chiefly felt in the reduction of rates.

III. Existing Physical Conditions.

6. The datum to which are referred all depths mentioned herein and all soundings shown on charts prepared by the United States Engineer Department is an assumed plane of low lake level, coinciding with the zero of the tide gauge at Fort Montgomery, N. Y. This plane was 8.75 feet above the lower miter sill of the most northerly lock of the old Champlain Canal at Whitehall, which lock has been removed. From observations dating back to 1871 it has been shown that the lake level falls below this plane only a few tenths of a foot at intervals of many years. The ordinary annual range of lake level is about 6 feet, the extreme range being about 9 feet. The highest recorded lake level occurred on March 30, 1903, when the reading on the Fort Montgomery gauge was 8.8 feet. For a comprehensive discussion of lake levels, with particular reference to the adoption of the plane of reference, see report of Lieut. Col. Edw. Burr, Corps of Engineers, dated January 10, 1910, on a survey of Plattsburg Harbor, N. Y., printed on pages 6 to 10 of House Document No. 759, Sixty-first Congress, second session.

7. There is little current in the "Narrows," even during the high-water season, there being no tributary streams of great magnitude.

8. The country surrounding the southern end of Lake Champlain is generally hilly and, in places, mountainous. While in the more precipitous hills the rock lies close to the surface, and is frequently apparent in outcrops, and while at a number of points along the "Narrows" rocky cliffs rise sheer out of the water, there is much fertile farm land running back from the lake, particularly on the Vermont shore. Presumably the bed of the stream was originally cut through the solid rock, but to-day there is a heavy deposit of silt through its entire length, and the clear waterway in the "Narrows" south of Bensons Landing, is generally limited by marshy flats, submerged only during high water, and even then is outlined by vegetation. Numerous side channels, generally not navigable, have cut their way into or through these marshes. South of Bensons Landing the distance from mainland to mainland varies from about 1,200 feet in the more open stretches to about 300 feet between the cliffs at the "Narrows" near Dresden. The general width of the clear waterway between the marshes is from 250 to 300 feet. North of Bensons Landing the marshes recede and the lake widens to an average width of half a mile to Crown Point, where it spreads out into the "Broad Lake." So far as is known at present rock would be encountered in opening a 12-foot channel of navigable width only in the vicinity of the "Elbow."

9. From soundings taken with a lead line from a moving boat the existing ruling depth in the main channel in the harbor of Whitehall appears to be little over 7 feet. While through the greater part of the remainder of the channel through the "Narrows" there appears to be a depth in excess of 12 feet, the ruling depth is probably not greater than 9 to 10 feet, and much difficulty is experienced from shoals projecting from the sides of the channel. The difficulty is increased by sharp curves, and in a number of places the shape of the hills is such that prevailing winds make it exceedingly hard for tows to round the curves without being carried against the sides of the narrow channel, either on the shoals or against the cliffs. At many

of these points it is impossible for tows to pass one another, and one tow or the other has to lie to at the mercy of the wind. Delays of from two to four hours due to this cause are of frequent occurrence.

10. The most difficult curve in the stream is that around the rocky promontory at the "Elbow." This curve is so sharp that a 40-foot motor boat was unable to round it without slowing down, and was entirely unable to keep in the middle of the channel without backing. On approaching this point from the south there is first encountered a 90° turn to the right, with a radius to the center line of the channel of about 450 feet. Tangent to this curve is a curve of about 160° to the left, on a radius to the center line of the channel of about 230 feet. It seems impossible to effect a practical alleviation of these conditions by the process of widening the existing channel at this point except at a prohibitory cost for rock excavation.

11. Other points at which obtain objectionable conditions named in paragraph 9, are: Opposite and below entrance to South Bay; at Beacon No. 18; above Beacon No. 4; opposite Chubbs Dock; between Maple Bend and Beacon No. 8; immediately south of the "Narrows" near Dresden; between Beacon No. 6 and Pulpit Point; and near north end of Cedar Mountain at the southern entrance to the channel dredged under the original project.

IV. COMMERCIAL LOCATION.

12. The "Narrows" of Lake Champlain forms one link in a continuous waterway from New York, N. Y., to the St. Lawrence River, via the Hudson River, New York to Waterford, the Champlain Canal from Waterford to Whitehall, the "Narrows" of Lake Champlain, Whitehall to Crown Point, Lake Champlain, Crown Point to Rouses Point, the Richelieu River and the Chambly Canal, Rouses Point to the St. Lawrence. The Erie Canal, connecting the Great Lakes at Buffalo with the Champlain Canal at Waterford, makes the "Narrows" an integral part of another waterway from Canada and the Champlain Valley to western New York, northwestern Pennsylvania, and all ports on the Great Lakes. The principal ports on Lake Champlain are Port Henry, N. Y., Burlington, Vt., Plattsburg, N. Y., and Rouses Point, N. Y. Other ports are Whitehall, N. Y., Ticonderoga, N. Y., Vergennes, Vt., and St. Albans, Vt. Two railroads parallel the lake throughout its length, the Delaware & Hudson Co. on the west side, and the Rutland Railroad, owned by the New York Central, on the east side. The Central Vermont Railroad touches the Lake at Burlington and St. Albans, and at Rouses Point the three railroads above named and the Grand Trunk Railroad all converge.

V. COMMERCIAL SITUATION.

13. It is believed that this waterway has played a very vital part in the past development of the Champlain Valley, and through this has contributed in no small measure to the prosperity of the country at large; all this by reason of the traffic which was carried by the old Champlain Canal. The capacity and equipment of this canal have not been improved materially during the past 50 years, and as an important carrier it has been completely outdistanced in competition

with the progressive railroads. Hence it is doubtful if the commercial value of this waterway, measured by the tonnage which it carries to-day, would justify expenditures on the "Narrows" of Lake Champlain for anything further than maintaining past improvement. It is therefore felt that present-day statistics of commerce carried by this waterway and of all commerce carried by paralleling railroads must be considered only as a hypothesis on which to base deductions as to the commerce which should seek this highway on the completion of the new barge canals now being built by the State of New York, and that the pecuniary benefits to be derived by the people of the United States through this future commerce must be taken as the measure of the amount which the Federal Government should invest in the improvement of this waterway.

14. While the characteristics of the Champlain Canal are felt to be the governing element in the present-day status of commerce through the "Narrows," the influence of certain other elements affecting rates and the promptness and reliability of water carriage should be considered. It is assumed that the conditions governing the handling and transfer of freight at points of shipment, delivery, and transfer along the Hudson, the Erie Canal, and the Great Lakes, and their influence on rates and on the other elements affecting the use of water transportation are well understood. Hence existing conditions at the ports on Lake Champlain alone will be detailed.

15. The business originating in the port of Whitehall is relatively small. The wharves at this port are all privately owned and are generally in poor condition. They are, however, open to public use without charge. The distance from the wharves to the business center of the town is about one-quarter of a mile, and cartage charges average about $0.50 per ton per half mile. The railroad freight depot is about the same distance from the business center of the town, but there are facilities for direct transfer from boat to car at the wharves. Freight rates to New York are from $0.90 to $1 per gross ton by water, and from $3.30 for sixth-class to $6.60 for first-class freight by rail. About 90 per cent of the original commerce of this port is carried by rail. No public space is available for the construction of wharves, but land suitable for this purpose is held by citizens who, in view of the general benefits to be derived, express themselves as being willing to dispose of it at a very reasonable figure. Unscreened sewage is being discharged into the harbor. Local opinion gives the inadequacy of the old Champlain Canal and the poor condition of the channel through the "Narrows" as the principal reasons for the small proportion of water-borne commerce. Whitehall is the point at which tows are made up and broken for commerce from and to the Champlain Canal, respectively. There are somewhat antiquated mechanical appliances for handling coal at the wharf below the Elbow owned by the Delaware & Hudson Railroad Co.

16. Existing wharves and in fact the entire water front at Port Henry are privately owned, and a small charge for wharfage is made to all parties on equal terms. There are mechanical appliances for handling ore at some of these wharves. The commerce of Port Henry is principally iron ore and iron products from and coal and coke to the extensive iron mines located about 6 miles from the port. The tracks of the Delaware & Hudson Railroad pass along the shore of the

harbor, and a modern, thoroughly equipped railroad owned and operated by the mining companies connects the mines with the Delaware & Hudson Railroad and with the wharves. "Up to about 10 years ago the largest percentage of ore shipments were made by water, but owing to an insufficient depth of the water in the present Champlain Canal and the fact that it is so soon to be abandoned that no new boats have been built, and those formerly in service having worn out, shipments by water have so dwindled that in 1910 the proportion was 95½ per cent by rail and 4½ per cent by water." Cartage charges for merchandise from the wharves to the business center of the town, a distance of about one-quarter of a mile, are about $1 per ton. The present freight rate by rail to New York for bulk freight is $1.55 per gross ton, and the present rate via the old canal is $1.10 per gross ton.

17. The city of Burlington does not now own any public wharves, but has the right of wharfage at the foot of several streets and has instituted sequestration proceedings to take additional lake frontage, adjoining the foot of College Street, where a dock will in time be built, to be used on equal terms by all. There are two or three wharves where the public now have facilities for receiving and shipping, but at charges said to hinder competition and prevent low rates. Both railroad terminals are at the water edge of Lake Champlain. The present terminal facilities both by rail and water are held and controlled by corporations and are not offered on equal terms to all outside shippers. So far as known there are no mechanical appliances for handling freight except some hoisting apparatus at one of the coal docks. There is land available for a public dock, but it is outside of the breakwater limits as at present constructed. It would seem possible to build a public dock in prolongation of College Street in the center of the harbor and in close proximity to the railroad terminals. Wholesale grocers have to pay rental to the Rutland Railroad for a warehouse on one of its wharves. The business center of the city is a quarter of a mile from the railroad terminals and wharves. Railroad freight rates on coal are $2.75 a ton direct from the mines, which is 5 cents better than the present rate by canal boat, considering the expense of unloading. Rates by rail and boat are now about the same, at 28 cents to 35 cents per hundredweight from New York to Burlington. Other water freight rates are generally lower, but the lack of free terminals and the cost of handling in small canal boats and unloading therefrom causes most of the freight to come by rail. The total tonnage by water is only about 25 per cent of the gross tonnage in and out of Burlington throughout the year. Sewage is discharged into Lake Champlain at the south end of the harbor.

18. At Plattsburgh, N. Y., there are no wharves owned by the public, though public space is available for their construction. At the privately owned wharves it appears that discrimination in the matter of charges or in other ways is not uncommon. There is mechanical apparatus for handling coal at some of these docks. The business center of the city is about one-quarter of a mile from the freight depot of the Delaware & Hudson Railroad and the same distance from the present steamboat landing. The freight rates by rail to New York are from 17 to 45 cents per hundredweight, and by water average from $1.25 per ton on heavy materials to $2 per ton on lighter materials, such as hay. It has been customary to ship package freight by water

only between ports on Lake Champlain, very little through package freight being shipped by water "for the reason that there are no packet lines between Montreal and New York and intermediate points, due to the excessive terminal and dockage charges at New York City, Plattsburgh, and various other points, and to the absolute lack of facilities for the prompt and easy interchange of freight from rail to water, but most of all to the fact that the railroads have never been compelled to issue through bills of lading for shipments from interior points partly by rail and partly by water." Sewage is now discharged into the Saranac River near the harbor, and is not screened or otherwise treated.

19. Rouses Point is chiefly a transfer point relatively little commerce originating there. However as four railroads and the Canadian Canal converge it is a port of great importance to traffic on Lake Champlain. Though there are no publicly owned wharves, a wharf owned by the Rutland Railroad is open to the use of the public on equal terms to all. Public space is available however for the construction of wharves. The ratio of freight to water rates is about the same as at Plattsburgh in spite of the greater railroad competition.

20. At the smaller ports along the lake generally similar conditions prevail to those described. However, at Vergennes, Vt., there are two public wharves with apparatus for handling coal, and participation in through lake traffic is urgently desired to give relief from excessive rail charges prevailing at present.

21. As bearing on another element influencing water rates under present conditions, the following statement, contained in a letter from the Royal Insurance Co. of New York, is quoted:

> We find upon inquiry that marine business on Lake Champlain and waters tributary thereto has been quite unprofitable, and the writing of it has been confined to a very few companies, and unless the deepening of the canal approaches and the removal of the shallows of the lake should result in the introduction of a better class of craft than is now employed, there will be no reduction in the average rate, no matter how much money was spent.

22. At present boats 110 feet long, 23 feet beam, and drawing 6 feet can navigate the Canadian waterways from Rouses Point to the St. Lawrence.

VI. COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1910.

23. Commercial statistics for the "Narrows" must be deduced from a comparison of reports of commerce passing to and from the Champlain Canal with other reports. The data from which the following tables were compiled were furnished by local boards of trade, commercial clubs, and chambers of commerce; by officials of the United States customs service, and by individual citizens. Deductions as to future commerce must be based on a consideration of the various increments combining to make up the commerce of the "Narrows," that is, a study of the existing commerce, both rail and water, of the various ports, where the commerce of the "Narrows" originates or to which it is destined. It is believed that the ports named in paragraph 12 above furnish 90 per cent of these increments (the traffic from Rouses Point including water shipments to and from Canada).

CALENDAR YEAR 1910.

TABLE A.—*Freight-clearing office of canal collector at Whitehall.*

	Tons.
General merchandise	9,292
Coal and other fuel	118,065
Building and road materials	175,014
Manufactures	1,098
Minerals and products	19,342
Farm products	16,866
Pulp wood	142,968
Wood pulp	11,675
Total	494,320

Value not obtainable.

NOTE.—While this commerce probably represents the greater part of the commerce of the "Narrows," it does not include commerce transferred from rail to boat, or vice versa, at Whitehall, no exact figures for which were obtainable.

TABLE B.—*Freight handled by the Lake Champlain Transportation Co. through the "Narrows."*

[This company handles at least 75 per cent of the freight passing the "Narrows."]

	Tons.
Coal and other fuel	91,546
Building and road materials	46,673
Minerals and products	18,514
Manufactures	365
Farm products	8,323
Wood pulp	245,286
Pulp wood	13,090
Total	423,797

Value not obtainable.

A comparison of Tables A and B shows that 103,733 tons of pulp wood and wood pulp were carried by the Lake Champlain Transportation Co. which did not pass the Champlain Canal. Presumably this commerce was transferred to the railroad. Assuming that the Lake Champlain Transportation Co. handles about 75 per cent of the commerce of the "Narrows," a consideration of Tables A and B would indicate that the total commerce of the "Narrows" for the calendar year 1910 was about 640,000 tons.

TABLE C.—*Commerce to and from the port of Ticonderoga, N. Y.*

	Tons.
By boat: Pulpwood, clay, sulphite, alum, and coal	9,576
By rail: Same articles and other merchandise	210,000

These figures cover shipments to and from paper mills only. The total commerce of the town is estimated as 240,000 tons. Probably 50 per cent of this commerce parallels the water route through the "Narrows."

TABLE D.—*Commerce to and from Port Henry, N. Y. (including rail and water shipments).*

	Tons.
Iron ore	954,391
Pig iron	55,000
Coal and coke	150,000
Total	1,159,391

No reliable statistics as to other commodities are available, but the population tributary to the town is about 10,000. The most important industry is the mining and reducing of iron ore. About 95½ per cent of the exports and 98½ per cent of the imports are carried by rail. Probably 95 per cent of the commerce parallels the New York Champlain water route.

TABLE E.—*Commerce to and from Vergennes, Vt.*

	Tons.
Received by rail: Coal, building materials, and general merchandise	7,820
Shipped by rail	4,436
Received by water: Lumber, coal, brick, and merchandise	13,200

TABLE F.—*Commerce to and from Burlington, Vt.*

	Tons.
By canal boat:	
Lumber	32,500
Coal	40,000
General merchandise	10,000
Total	82,500
By steamers	7,500
Total by water	90,000
By rail	282,183

This port is a receiving and distribution center for Vermont (northern), and there is much commerce with Canada.

Probably at least 60 per cent of its commerce parallels the New York-Champlain water route.

TABLE G.—*Commerce (rail and water) to and from Plattsburg, N. Y.*

	Tons
Pulp and paper	264,000
Automobiles	10,000
Farm produce	20,000
Merchandise	18,336
Carbide and coke	3,800
Total	316,136

Probably 50 per cent of this commerce parallels the New York-Champlain water route.

The value of imports during the fiscal year ending June 30, 1910, was $8,492,822.05.

TABLE H.—*Water-borne commerce passing Rouses Point.*

Class.	Tons.	Value.
General merchandise	16,355	$139,140
Coal and other fuel	90,002	150,010
Building and road materials	92,645	1,671,368
Manufactures	96,574	520,670
Minerals and products	20,094	80,376
Total	315,670	2,861,564

Value of exports and imports, fiscal year 1910 (including railroad commerce).

[Fom records of customhouse.]

	Value.	Duty.
Imports	$6,737,067.00	$288,288.20
Exports	9,045,152.00	[1] 420,455.00

[1] Merchandise in transit.

Probably 80 per cent of the water-borne traffic passes through the "Narrows."

TABLE I.—*Vessels navigating Lake Champlain.*

Lines and class.	Number.	Maximum tonnage.	Maximum draft.		Maximum length.	Maximum width.	Minimum width.	Minimum length.	Trips.	Passengers.
Lake Champlain Transportation Co.:			*Ft.*	*in.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*		
Tugs and steamers	4	176	12	0	112	23	....	....	200	[1] 5,000
Sailing vessels	15	125	6	0	....	....	....	....	50	
Barges	460	100	5	0	....	17	....	....	4,000	
Whitehall & St. John's Towing & Transportation Co.:										
Tugs	3	99	10	0	....	....	....	70	....	....
Canal boats	140	100	[2] 5	0	....	....	....	....	....	....
Champlain Transportation Co.:										
Steamers	3	1,200	6	3	262	62	....	....	246	17,928
Daniel's Line:										
Steamers	2	29	7	0	76	14	11	....	([3])	[4] 150

[1] As owners and guests. [2] About. [3] Twice daily. [4] To each party.

In addition there are a number of small steamers and miscellaneous craft not operated by any regular transportation company.

Also several lines of ferries.

The lake supports an exceedingly large fleet of pleasure craft, chiefly motor boats.

VII. IMPROVEMENTS UNDER WAY AND PROJECTED, WHICH WILL AFFECT THE COMMERCIAL SITUATION.

24. The Champlain Canal is now being rebuilt by the State of New York. The new canal is expected to be open for navigation from Waterford to Whitehall for the season of 1913. In view of recent actions by the authorities of the State of New York, it is probable that the lock and dam in the Hudson at Troy for the construction of which a Federal appropriation was made will not be completed before 1914 or 1915. The ruling dimensions of the locks are: Length in the clear, 310 feet; width, 45 feet; depth over miter sills, 12 feet. The canal will accommodate barges carrying from 2,000 to 2,500 tons. No towpath is provided, and it is expected that the barges will be propelled under their own power or towed either by steam tugs or power barges. These barges will be able to navigate the new Erie Canal, and if the present project for the Intracoastal Canal from Boston to Key West and the Gulf of Mexico is carried to completion, it is probable that a type of boat will be developed capable of the most economical operation over the entire canal system of the Eastern States and able to navigate the Great Lakes and the Gulf of Mexico.

25. It is understood that a project has been adopted by the Canadian Government for increasing the horizontal dimensions of the locks of the Chambly Canal, leaving the ruling depth of water at 7 feet. The standard depth adopted for the more important canals of the Dominion of Canada is 14 feet, and movements have been on foot for the past two years which will almost certainly result during the next three or four years in the rebuilding of the Chambly Canal to give a depth corresponding to the maximum facilities of the New York State canals, or in the building of a new canal with a depth of 12 or 14 feet over the miter sill, from the foot of Lake Champlain over the shortest route to the St. Lawrence River. A report was submitted to the Secretary of War of the United States and the

minister of public works of the Dominion of Canada on November 15, 1906, by the International Waterways Commission, regarding cooperation between the two nations on a scheme for improving navigation between Lake Champlain and the St. Lawrence, involving the regulation of the level of the lake by the construction of a dam in the Richelieu River. In 1909, Sir Wilfred Laurier, the Governor General of Canada, expressed himself as being "greatly interested and heartily in accord with" a project to improve the Richelieu River to correspond with the New York State waterways. It is understood that this project is being developed at the present time.

26. A bill involving the expenditure of about $18,600,000 for State-owned canal terminals is now before the Legislature of the State of New York, and present indications are that it will become a law within the next few days. The bill, as reported, provides for the construction of adequate terminal docks, equipped with the most modern appliances for the handling, storage, and transshipment of freight at Whitehall, Port Henry, Plattsburg, and Rouses Point on Lake Champlain, and at all important ports on the Hudson River and the Erie Canal. Another measure requires through prorating on the part of railroads with navigation companies.

27. In addition to the wharfage facilities to be supplied by the State of New York, plans are now on foot for increasing these facilities by local aid at Burlington, Plattsburg, and Rouses Point. The secretary of the Commercial Club of Burlington, Vt., in a letter dated May 11, 1911, states:

> The people's desire at present is that the city extend the public dock out from the foot of College Street * * * directly at the railroad terminals. * * * Arrangements are being made to be prepared to build a public wharf as soon as actually needed under changed shipping conditions and canal facilities. The city is now petitioning the public service commission for a union railroad station at the water front, at and near the site for the public dock to be owned by the city. The city of Burlington * * * has instituted sequestration proceedings to take additional lake front * * * where a dock will in time be built * * *.

At Plattsburg it is proposed to supplement the State terminal, when increase in commerce shall warrant it, by constructing city-owned wharves in the mouth of the Saranac River at a point within a stone's throw of one of the principal business streets and in close proximity to the tracks of the Delaware & Hudson Railroad. At Rouses Point citizens propose to build a concrete bulkhead paralleling the shore for a distance northward from the shore end of the State terminal wharf, filling behind it with material to be dredged from the basin thus formed.

28. Throughout the Champlain Valley a great increase in industrial activity is anticipated as the result of the measures now before the Legislature of the State of New York, heartily indorsed by the governor of the State, for impounding for power purposes a vast amount of water now running to waste in the Adirondack Mountains during the seasons of freshets. It has been estimated that the commercial value of this water power is comparable to the value of the coal fields of Pennsylvania.

29. If the reciprocity agreement with Canada becomes a law it is probable that it will greatly increase the transportation on Lake Champlain, especially in such commodities as farm, field, and forest products.

VIII. PROBABLE EFFECT OF THE IMPROVEMENTS ON THE COMMERCIAL SITUATION.

30. The business men at all of the ports on Lake Champlain, assuming that the "Narrows" of Lake Champlain will be so improved as to allow the full development of the facilities offered by the new Champlain Canal, are expecting, with the new terminals to be provided, a reduction of nearly 50 per cent in water freight rates on through shipments, and the establishment of barge and packet lines, giving prompt and reliable service from Lake Champlain south. Later they expect the extension of this system to Canada. They are planning to take full advantage of the opportunities which will be offered, and expect not only a material reduction in all freight rates, but through this an unprecedented increase in business and prosperity.

31. It is undoubted that the resources of the Champlain Valley are very largely undeveloped at the present time. Some of these are very extensive deposits of iron ore, granite, and other minerals, water power for manufacturing purposes unparalleled in the United States, and a soil and climate peculiarly well adapted to fruit growing and dairy farming. Lake Champlain is situated midway between the greatest markets of Canada and the United States, on direct routes of rail and water communication. The number of wealthy business men who use the lake as a summer recreation ground is steadily increasing, which, it is believed, will prove to be an element of no little importance in the future commercial development of this region.

32. The following extracts are quoted from a letter received under date of May 5, 1911, from Mr. F. S. Witherbee, president of Witherbee, Sherman & Co., of Port Henry:

> * * * Port Henry is the shipping point for what is known in the iron and steel trade as the "Port Henry iron-ore district." * * * The Port Henry ores are the highest in iron contents of any ores mined in this country and are used in variable percentages by nearly every plant east of the Allegheny Mountains and as far east as Nova Scotia, and during periods of depressed business conditions have been exported to Europe. * * * When the new State barge canal is completed, as it is expected to be in the spring of 1913, without doubt a large percentage of ore shipments will go forward by water, as is shown by the following rail rate to principal points of consumption now and the estimated rates that will probably be put in effect when the new barge canal is completed, viz:

	All-rail rates.	Estimated barge canal rates.
Port Henry to—		
New York and vicinity	$1.50	$0.50
Bethlehem, Pa	1.60	1.00
Reading, Pa	1.70	1.20
Buffalo, N. Y	1.55	.60

> By the above reduced rates a much larger tonnage and a much wider market should prevail for the ores of this district. * * * In addition to its importance as an iron-ore distributing point, Port Henry is a large distributing point for merchandise to the adjacent towns. There are two national banks, a shirt factory, a blast furnace, railroad shops, a large electrical power plant, a flour mill, a gas and electric plant, etc. * * * With the benefits likely to accrue from the barge canal there will be at least an outward tonnage from Port Henry annually of 1,500,000 tons, and an inward tonnage of not less than 150,000 tons, principally coal and coke. * * *

33. The secretary of the Commercial Club of Burlington, Vt., writes:

* * * Burlington is a good jobbing point for Vermont. And I am credibly informed that with a 50 or 60 per cent rate to New York by boat, that the merchants here could materially increase their business by meeting competition in outlying points that is now impossible to reach because of high freight charges to Burlington. The immediate population in this vicinity is about 40,000 with which Burlington trades. Burlington and Winooski are about 25,000. * * * Freight rates on coal are $2.75 direct from the mine, * * * but with the proposed changes with larger barges even without free terminal facilities, the rate could be 50 cents per ton from New York, so that the consumer ought to get his coal at least $1 per ton cheaper than the present high price of $7.50 per ton for anthracite; in other words, instead of one-fourth of the tonnage coming by water as at present it is estimated three-quarters of the coal tonnage will be shipped under the new proposed canals facilities. Take, for example, roofing. * * * All of this would be done by boat under reduced freight rates. Cement, where 300 carloads of 20 tons each are now received, only 10 per cent comes by boat, and at least 50 per cent should be received by boat if the rate is 50 to 60 cents per hundredweight. One firm shipped broom fiber by rail at 24 cents per hundredweight rate into Pennsylvania. * * * In large barges flour ought to be shipped from Buffalo to Burlington almost entirely by water during the open season. * * * On rebuilding the canal and facilities it is estimated three times as much tonnage of the present business would be carried by water; and if the water rates were reduced to 50 to 60 cents per ton from New York to Burlington, a much larger volume of business would be done at Burlington.

34. From Plattsburg it is reported that:

There is now a tonnage * * * available for the canal amounting to 317,136 tons per annum, that * * * it will certainly be enormously increased in the very near future by the development of the tremendous water-power resources from the Adirondacks, * * * to say nothing of the enormous increase that will naturally follow as the result of the completion of the Champlain Canal and the building of * * * terminal.

35. In a report signed by John R. Myers, of Rouses Point, it is stated:

* * * There are five railroads and two branch lines entering Rouses Point, and of these roads and branches Rouses Point is the termini of six, as follows: Delaware & Hudson Co., Grand Trunk Railway (Champlain division), Grand Trunk Railway (Canada-Atlantic division), Central Vermont Railway, Quebec, Montreal & Southern Railway, Napierville Junction Railway; and Rouses Point is a station on the O. & L. C. division of the Rutland Railroad. All of the area covered by these railroads would receive the benefit of water transportation from Rouses Point, provided terminal facilities were established. The Delaware & Hudson Co. and the Rutland Railroad would naturally enter into competition with water transportation. * * * The principal commodities received by water will be farm, field, and forest products, coal, sand, building material, stone, iron ore, etc. * * * It has not been customary to ship package freight by water, owing to lack of facilities, but it is contemplated that upon the completion of the New York State barge canal system that package freight will be extensively handled. * * * If the reciprocity agreement between the United States and Canada becomes a law, it will greatly stimulate the transportation business through these waterways * * * and as the initial railroads would not be interested in the earnings on said traffic beyond Rouses Point, it is to be assumed that traffic would be delivered to the marine transportation companies on equal terms with the connecting railway lines, and * * * a large percentage of this traffic would naturally be diverted to the waterways.

36. The statements given above are indicative of a feeling which exists at practically all points along the lake. The opening of the New York State canals, and of the "Narrows" to meet their requirements, will result in a large increase in commerce and through it will benefit a wide territory and large population. In view of the character of the statistics at hand it is thought inadvisable to make at this time a quantitative estimate of the increase to be expected, and lacking complete information as to the money value of the com-

merce, present and prospective, it is impossible to formulate an accurate estimate of the pecuniary advantages to be derived. It is felt, however, that the worthiness of improving the "Narrows" to meet barge canal standards at least has been demonstrated, and should a survey be ordered statistics can be collected on which to base a more accurate estimate of the amount which should profitably be expended in the improvement, and as to the limit to which the improvement should be carried.

IX. CONCLUSIONS.

37. In my opinion the "Narrows" of Lake Champlain are worthy of improvement at national expense. Improvements which are imperatively needed are to remove the sharp bend at the "Elbow," install new fender booms at the rocky promontory mentioned in paragraph 4, and carry through by dredging on the shoals in the harbor of Whitehall and between Whitehall and Bensons Landing a channel with a least width of 150 feet and a depth at low lake level of 12 feet. Two tentative schemes for improving the "Elbow" have been considered. One is to make a narrow cut through the rocky promontory from the present channel on the south of the "Elbow" with a slight curve to the west, to the channel on the north of the "Elbow," meeting it at a point just to the east of the high part of Putnams Rock. The other scheme is to dredge a new channel through the marshes to the east of the low hills lying along the east bank of the entrance to the harbor of Whitehall, from the harbor itself to the extreme easterly portion of the curve at the "Elbow." A rough estimate would show that the cost of these two projects would be about the same, but the latter would appear to give greater benefit to navigation. Just how far the improvement of the channel as a whole should be carried can only be determined by further study, particularly with regard to the saving which would accrue from reducing the curvature and widening the channel in the more tortuous reaches.

38. Dredged material can be disposed of by pumping into the marshes at a number of points, or it can be carried out into the broad lake and dumped.

X. RECOMMENDATION.

39. I would therefore recommend that a survey of the "Narrows" be ordered with a view to the preparation of a project for and estimate of cost of improvement. It is estimated that an instrumental survey of that part of the "Narrows" lying between the lock at Whitehall and Bensons Landing, to include soundings from shore to shore of all channels which it may be deemed wise to consider in making a selection of the most satisfactory and economical route, borings where needed to indicate the character of materials to be excavated, the establishment of permanent stations and bench marks, the determination of the elevation of marshes and lake levels and sufficient topography to give an adequate idea of riparian property and other characteristics, can be made at a cost of $6,000. A detailed itemized estimate of the cost of this survey is appended hereto as inclosure A-2.[1] An additional sum of $200 is estimated as necessary for the proper collection and collaboration of accurate commercial statistics, and other pertinent data; the amounts estimated to be

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[1] Not printed.

paid from the appropriation for examinations, surveys, and contingencies made by section 3 of river and harbor act of 1910.

40. A report on commercial statistics of the "Narrows," containing other valuable information, prepared by Mr. C. E. Holden, of Whitehall, N. Y., the president of the Lake Champlain Transportation Co., is appended hereto as inclosure "A-1."

41. There are no possibilities for the development of water power in connection with the improvement of this waterway.

Very respectfully,

R. D. Black,
First Lieutenant, Corps of Engineers.

Col. N. M. Black,
Corps of Engineers.

[Inclosure A-1.]

Report on Commercial Statistics and Other Matters Relating to Commerce on the Narrows of Lake Champlain.

[Prepared and submitted by Mr. C. E. Holden, president Lake Champlain Transportation Co.]

Lake Champlain Transportation Co.,
Whitehall, N. Y., May 3, 1911.

Sir: I have the honor to inclose detailed report of such information as I am able to gather, and such suggestions as occur to me, in the limited time at our disposal.

Respectfully, yours,

C. E. Holden.

Lieut. R. D. Black, *Albany, N. Y.*

Vessels employed in trade in 1910, Whitehall.

Class.	Number.	Trips (in and out).	Maximum tonnage.	Maximum draft (feet).
Tugs and steamers	7	200	176	12
Sailing vessels	15	50	125	6
Barges, etc	500	4,000	100	5
Miscellaneous craft	500	1,000		

Passengers carried: None for hire; perhaps 5,000 as owners and guests.

TO AND FROM WHITEHALL ONLY.

[Memorandum of information required for use in connection with examinations relative to desired improvements.]

War Department,
United States Engineer Office,
Albany, N. Y.

Are any wharves owned by the public at which terminal facilities are extended to all on equal terms? If so, what? None.

Are these terminal facilities held by individuals or corporations, which are extended to all on equal terms? Yes.

If no wharves are open to the public use, is public space available for the construction of wharves? No.

Report what terminal and transfer facilities not open to the public exist. None.

What area and what population receive the benefits of water transportation? The water freight that passes through Lake Champlain is supplied by a great many points all the way from Ottawa to Quebec in Canada and more or less from all the intermediate points along Lake Champlain, the Champlain Canal, and the Hudson River, and to some extent eastward along the Sound as far as Bridgeport and southward to Philadelphia and occasionally Wilmington.

What railroad lines enter into competition with water transportation? Delaware & Hudson only.

What is the distance of railroad terminals from water-front terminals? Connecting on dock.

What is the distance of business center from water-front terminals? One-fourth mile or less.

What is the distance of business center from railroad terminals? About one-fourth mile or less.

What are the freight rates by rail? What are the freight rates by water? It is difficult to answer these questions by a short statement. The water rates are at the present time a trifle lower than rail rates in most cases, but not in all. With deeper water and better facilities the water rates can be reduced very materially.

What is the distance and cost of haul from railroad terminal to business center? One-half mile; 50 cents per ton.

What is the distance and cost of haul from water terminal to business center? About one-half mile; 50 cents per ton.

Give list of regular transportation lines, with names, also dimensions and tonnage of vessels, points included in transportation route, and schedule of trips for each line.

	Tonnage.
Lake Champlain Transportation Co.:	
Protector	176
Cook, R. H	157
Tisdale, H. G	81
Defender	87
Whitehall & St. Johns Towing & Transportation Co.:	
Peerless	89
Unique	91
Triton	35

All the above boats tow between Whitehall and St. Johns, stopping at any intermediate points where there are boats to be dropped or taken up. The largest is the *Protector*, 112 feet long, the smallest is the *Triton*, about 70 feet long. In a general way, these make a trip once a week.

Are any steps being taken to improve public terminal facilities, rail connections, etc., along the water front? No.

Same relative to individuals or corporations? No.

What are the principal commodities received by water? Lumber and pulp wood and coal.

Same as to shipments? Lumber and pulp wood and coal.

What is the approximate amount of package freight, and what are the facilities of wharf storage and delivery to consignees? None.

Do vessels receive return cargoes, or do they leave harbor empty or only partly loaded? About one-half get return cargoes.

When possible, obtain the proportion of freight varried by rail and water, expressed in percentage. Ten per cent by water.

When railroad rates are higher than water rates, and the proportion of bulk freight carried by rail is greater than that carried by water, ascertain, if possible, the cause of greater shipments by rail. Lack of facilities by water—limitations of old canal.

Is sewage discharged into the harbor, and if so where? Yes. Is sewage purified or screened before final discharge? No.

Can dredged material be disposed of within pumping distance, if so will riparian owners permit it to be placed on their lands? Yes.

What is the nature and purpose of the desired improvement? It is desired that the channel may be straightened and deepened at places where needed between Whitehall and Port Henry, particularly between Whitehall and Benson.

STEAMBOATS ON LAKE CHAMPLAIN.

There are 10 steamboats on Lake Champlain, 3 passenger and 7 tugs, regularly engaged in business. The passenger boats you can get statistics of from Mr. D. A. Loomis, general manager, Burlington, Vt. The tugs run between Whitehall and St. Johns, as a general thing making one trip a week. The largest tug is 112 feet long, 23 feet beam, with a maximum draft of 12 feet. The smallest tug is about 70 feet long, 15 feet beam, with a minimum draft of 6 feet. The others are from 80 to 105 feet long, with a width of around 20 feet and a draft of 8 to 10 feet. Larger tugs could be used on the lake to good advantage if they could be gotten here, but they are limited to the capacity of the Chambly Canal locks. These are steel screw tugs.

The passenger boats are side-wheelers. The tugs carry a crew of from 9 to 10 men and run night and day while en route. The largest tugs can handle about 50 loaded canal boats, or, say, 100,000 tons of freight. As a matter of fact, however, this limit is very seldom reached, and it probably would not be economical to attempt to handle tows of that size regularly. Of course, there are many small steamers.

CANAL BOATS.

The barges almost universally in use on the lake are canal boats. These are of slightly different types, but in the main all alike. They are slightly less than 100 feet long and a little over 17 feet wide. They range in height from 8 to 10 feet. No new boats are built now less than 9 feet. These boats carry about 160 gross tons loaded 4 feet 6 inches, which is the draft allowed through the Champlain Canal. Loaded down to 6 feet, which is the draft allowed in the Chambly Canal, they will carry from 250 to 300 tons. There are a few "pin flats" in use on the lake. These are Canadian sailing vessels with a single mast, but they usually tow. As a rule they will not carry as much as a canal boat on the same draft. There are on the lake, perhaps, half a dozen barges 110 feet long with a 23-foot beam, which is the maximum size of the Chambly Canal locks. These boats will carry about 30 per cent more than a canal boat, but as they can not go south of Whitehall, they have not been profitable so far.

DOCKS AT WHITEHALL.

The docks on both sides of the harbor are all owned by private parties. There are no public docks of any nature in Whitehall. However, for at least 50 years the public has had free use of these docks without any charge and without much restriction. The natural result is that the docks are not in very good condition. The public furnishes nothing toward their maintenance, and the owners naturally do not feel like expending any more money on them than they can help, as there is no return to be expected. Perhaps this is one of the reasons why commerce here has not developed as it otherwise might have done. There is about 2,000 feet of fairly good dock on the west side of the harbor and 400 or 500 feet of what can be called dock on the east side, but this last is not in good condition, and there is not over 4 or 5 feet of water in front of it. The Delaware & Hudson Co. owns several hundred feet of fairly good dock on the west side about 1 mile below the village, but they use this exclusively for their own business of transferring coal. The Union Bag & Paper Co. have two transferring plants on the west side, by which they transfer from 50,000 to 100,000 cords of wood from boats to cars each year.

THE ELBOW.

This rocky point is valuable as being the most eligible place for a boat yard and dry-dock to be had. Indeed, it is the only place where a floating dry-dock can be maintained, because it is the only place where there is a sufficient depth of water out of the channel to sink the boxes. This property, with the improvements on it, which would have to be destroyed if the point was cut off, would be worth, I should judge, $15,000, and the point being solid rock it would be quite an expensive proposition to cut it down to the depth of 12 feet below low water, and then it would leave a rather bad bend at the north end.

THE MARSH.

On the east side of the lake near its borders are two hills which rise to the height of perhaps 100 feet, but they are circular and rather small in diameter. It has been proposed to cut through the dock on the east side a little way south of the southerly hill and make a channel through the marsh in the rear of these two hills, joining the lake at the Elbow. A study of the map will show this plan more easily than it can be described. This would give an easy and gradual curve, and the cost of cutting through the marsh would be inconsiderable. There is plenty of room on which to dump the refuse. The dock at the southerly end of this cut is of considerable value, and it is possible there might be some rock encountered for some distance at that end.

A SUGGESTION.

In connection with the above, it occurs to me, as the owner of the property, that it would be to the disadvantage of this island were it cut off, and it would make it almost worthless for private purposes. There also should be public wharves in this harbor, and it seems to me it would be for the interest of the Government to buy this island between the old and new channels. It would be valuable property for the Government, and the cost of the whole island would not be a great deal more than the cost of the right of way. I have a standing offer of $10,000 for the dock, which would be cut in two, and in addition to the dock this right of way would cut considerable other property, to say nothing of the marsh. The marsh I would ask nothing for, but, of course, I would expect pay for the dock. I would sell the whole island for $25,000, which, of course, would include the right of way.

FREIGHT RATES.

The only railroad line that enters Whitehall is the Delaware & Hudson. According to the best information I can get the rail rates from New York to Whitehall are according to the class of freight as follows:

	Cents per 100 pounds.
First class	30
Second class	27
Third class	22
Fourth class	19
Fifth class	17
Sixth class	15

It is expected that these rates will be reduced 25 to 50 per cent when the barge canal is in operation, but that will apply only to Whitehall. With an improved channel north the same argument will apply to ports on the lake.

TERMINAL FACILITIES.

The State purposes to build a dock and warehouse on the west side of the barge canal very nearly in the center of the village. At the present time the harbor wharves are from an eighth to three-fourths of a mile from the business section, and the railroad stations are about the same distance. The cartmen charge 50 cents a load to any part of the business section of the village without regard to distance. People having sufficient work to afford a team of their own ought to get it done somewhat cheaper than this. A cartman's load ordinarily is from one-half to one ton.

CHANNEL IMPROVEMENT.

The present rate by boat from Lake Champlain ports to New York is 90 cents to $1 per gross ton. It is expected that with larger boats and better water this rate can be reduced from 25 to 50 per cent. It costs very little, if any more, to crew a boat carrying 400 tons than one carrying 150 tons. The towing and such expenses will be higher, but not proportionately. It is doubtful, however, if these large barges could be handled successfully, if at all, in the channel as it exists at the present time. It should be straightened and in some few places deepened. There should be no bend with a radius of less than 1,200 to 1,500 feet. Straightening the channel in these bad places would be a considerable saving to the steamers hauling tows between Ticonderoga and Whitehall. At the present time they are very liable to run aground on the low points or sag into the rocky points and damage the boats. It takes about eight hours for a steamer with a large tow to cover this distance, and many times they are delayed from two to six hours at one point getting the tow out of the mud when they have grounded. To figure it in dollars and cents, assume that a tug is worth $3 an hour. If she could save 4 hours each trip that would be $12. Each tug makes about 25 round trips, or 50 trips, through the marshes, which would be $600. There are 7 tugs, which would make $4,200 saving in that item alone. Then, of course, there would be an equal saving in time to probably 4,000 or 5,000 (in the aggregate) barges. A canal barge is ordinarily considered worth $6 per day, or 25 cents an hour. A barge of the new type should be easily worth three times this, but say twice, to be on the safe side. Fifty cents an hour for 4 hours each trip would be $2. Four thousand trips would be $8,000.

But the most obvious reason for the improvement of the lake channel is the fact that the State has improved the canal so that it is superior in capacity to the present lake channel, and in order to make the State's work valuable to its fullest extent the lake channel must be brought up at least equal to the canal channel. All our figuring is on the basis of gross tons (2,240 pounds).

Freight clearing the canal collector's office at Whitehall, N. Y., during the season of 1910.

	Quantity.	Tons.
SOUTH BOUND.		
Lumber .... feet..	73,919,626	123,198
Shingles .... thousands..	400	50
Timber .... cubic feet..	29,000	580
Wood .... cords..	4,740	13,272
Pulp wood .... pounds..	283,694,300	141,847
Wood pulp .... do....	23,350,400	11,675
Hay .... do....	30,713,649	15,357
Apples .... barrels..	3,800	270
Potatoes .... bushels..	41,295	1,239
Iron and steel .... pounds..	324,980	162
Merchandise .... do....	1,461,700	731
Stone, lime, etc .... do....	46,690,400	23,345
Iron ore .... do....	37,658,880	18,829
Sundries .... do....	2,121,930	1,061
Total	....	351,616
NORTH BOUND.		
Timber .... feet..	883,000	1,472
Wood pulp .... pounds..	2,242,000	1,121
Castings, etc .... do....	237,400	119
Foreign salt	1,026,000	513
Iron and steel .... pounds..	1,634,000	817
Merchandise .... do....	15,000,000	7,500
Stone, lime, etc .... do....	52,737,800	26,369
Anthracite coal .... do....	187,688,420	93,844
Bituminous coal .... do....	21,897,960	10,949
Total	....	142,704
Grand total	....	494,320

Freight handled by the Lake Champlain Transportation Co. during 1910.

	Tons.
SOUTH BOUND.	
Lumber	29,875
Pulp wood	245,286
Wood pulp	11,475
Hay	8,323
Ore	15,540
Total	310,499
NORTH BOUND.	
Coal (anthracite and bituminous)	91,546
Clay	15,738
Iron and steel	365
Salt	480
Ties	345
Fertilizer	350
Pulp	1,615
Magnesite	335
Sand	715
Rosin	182
Phosphate	1,428
Asphalt	194
Total	113,298
Grand total	423,797

REPORT ON SURVEY OF NARROWS OF LAKE CHAMPLAIN, N. Y. AND VT

War Department,
United States Engineer Office,
New York City, November 25, 1912.

From: District engineer officer.
To: The Chief of Engineers, United States Army.
Subject: Report of survey of Narrows of Lake Champlain.

1. In compliance with instructions contained in department letter of June 19, 1911, the following report is submitted on the survey of the Narrows of Lake Champlain, N. Y., and Vt., ordered by river and harbor act approved June 25, 1910. The survey was made under the charge of Capt. R. D. Black, Corps of Engineers. The discussion on the commercial situation and the greater part of the substance of the report were also prepared by him.

2. The physical characteristics of the Narrows, the existing project for its improvement, work done under that project, a statement of the value of the waterway to commerce, and the commercial statistics for 1910 are given in the report of the preliminary examination submitted May 19, 1911. Since the submission of the report a survey of the Narrows has been made and additional commercial information collected.

I. The Survey and Its Results.

3. *Operations.*—The survey was commenced on September 10, 1911, after considerable delay resulting from difficulties met in organizing a suitable party. The field work was completed on December 23, 1911, and the winter and spring spent in platting the notes, preparing the map, and making studies and estimates. In the meantime efforts have been made to supplement the commercial data obtained heretofore and to secure the consensus of opinion of the communities interested in the waterway as to its requisite improvement.

4. *Maps, etc.*—The more general results of the survey are shown on the two charts herewith.[1] All soundings and shore elevations refer to the plane of low lake level established prior to 1871. For a description of this plane and an exposition of the reasons which led to its establishment and adoption, see pages 7–9, House Document No. 759, Sixty-first Congress, second session. The soundings in the channel were taken on ranges 100 feet apart and normal to the center line, the interval between soundings being about 10 feet. All the notes of the survey were platted and the finished charts were reduced therefrom. The topography was taken from the original maps of the survey of the Board of Engineers for deep waterways, and was checked roughly in the field. Rock borings in the cut at the Elbow were made during this survey; other rock borings were taken from the deep waterways maps. The computations of quantities used in estimates were made from the large scale original sheets and are based on depth and bottom widths described hereinafter with side slopes of 1 on 5 and with an allowance of 1 foot for overdepth cutting.

5. *Physical characteristics, general.*—Nothing was brought out by the survey to require an alteration or make necessary an extensive

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[1] Two sheets only are printed.

amplification of the description of physical characteristics given in the preliminary examination report. The hydrology of this waterway is unusually simple, and if the periodical variations in the lake level and the extreme range of temperature and other meteorological conditions are understood no further reference to physical data is necessary here in discussing the formulation of a project.

6. *Variations in lake level.*—The periodical variations in lake level are well described in the following extract from a report on a preliminary examination and survey of Plattsburg Harbor, N. Y., by Col. Edw. Burr (then lieutenant colonel) Corps of Engineers, printed in House Document No. 759, Sixty-first Congress, second session:

> Following the spring rains and the melting of the snow in the mountains, the lake rises to its highest stage each year. This rise ordinarily culminates in April or May with a gauge height of from 5 to 8 feet, highest water seldom failing to reach 5 feet and rarely exceeding 8 feet. During the summer and early fall, with a run-off through the Richelieu River greater than its inflow from its tributary streams, the lake slowly recedes to the low stage of the year. This low stage continues ordinarily from August to December, with some minor rises, due to fall rains. The lowest stage generally occurs in September or October, but has occurred as early as July and as late as February. During the low stage of the year the lake level fluctuates within narrow limits and on the average remains for 60 days within half a foot of the lowest stage reached, the extremes being 30 and 120 days. * * * The average of the lowest monthly means of the seasons from 1871 to 1909 is +1.02.

7. *Meteorological data.*—The extreme annual range of temperature recorded is from −21° to +96° F. The lake ordinarily freezes over and closes navigation during the latter half of December, and the ice breaks up during the first part of April of each year. The total annual precipitation is from 30 to 35 inches, of which an average of 5.4 falls during December, January, and February and of 11.5 inches during June, July, and August. Prevailing winds are usually north or south, with a mean velocity of 9 miles per hour. Two or three severe storms occur annually—generally in winter—with a maximum wind velocity of 66 miles per hour.

II. ADDITIONAL DATA ON SUBJECTS COVERED BY PRELIMINARY EXAMINATION REPORT.

8. *Tributary territory.*—The territory which depends on Lake Champlain for all transportation other than by rail includes the lake ports and the farming country for which these ports are centers of distribution and collection. The total estimated population of the counties surrounding the lake, as shown by census of 1910, is 305,900. No attempt will be made to estimate the population in the sphere of influence of the connecting waterways to the north and south or of the through business using the lake but not originating in or destined for its ports. Attention is invited, however, to the general discussion of the Atlantic waterways system contained in the report on the preliminary examination and survey of the Hudson River with a view to securing increased depth, submitted by this office on February 27, 1912 (H. Doc. No. 1160, 60th Cong., 3d sess.). History records how important the Lake Champlain water route between the Hudson and St. Lawrence Rivers was deemed by our forefathers. It is believed

that the future development of commerce on this route will cause it to be valued even more highly by our successors.

9. *Changes in Burlington.*—Since the submission of the preliminary examination report, the city of Burlington, Vt., has taken further steps toward the establishment of publicly owned docks and the improvement of its railroad terminal facilities. It is understood that a plan for the elimination of grade crossings and the improvement of track layouts, and prepared with particular regard to the future development of the water front, has been agreed upon tentatively by the city authorities and one of the two railroads entering the city, is opposed by the other railroad, and is now before the public-service commission of the State of Vermont for ratification. It should be noted that the two railroads entering the city, one from the north and the other from the south, parallel the water front at an average distance of about 600 feet, and have in the past controlled its development. In pursuance of the terminal project now pending, formal application was submitted by the mayor to the Secretary of War on June 16, 1912, for the establishment of harbor lines. This application has not been acted upon pending the completion of arrangements for a hearing at which the wishes of the citizens may be set forth. A report of the secretary of the Commercial Club of Burlington is herewith as inclosure No. 1. This report shows an estimated increase of from 50 to 100 per cent in the business of Burlington as the direct result of the opening of the Champlain-Hudson waterway, and gives a very interesting view of the general attitude of the community toward the proposed improvement and the realization of its benefits. (See par. 30.)

10. *Developments at Plattsburg.*—Progress has been made toward the execution of the terminal projects at Plattsburg mentioned in the preliminary examination report. A new chamber of commerce has been organized and has represented the city in its negotiations with the officials of the State of New York in regard to the location and details of the barge canal terminal, resulting in the tentative selection of a site north of the city and outside of the present harbor limits, but offering excellent possibilities for the future development of business. Communications from the secretary of the chamber of commerce are herewith as inclosure No. 2. (See par. 34, preliminary examination report.)

11. *Barge canal terminals.*—In paragraph 26 of the preliminary examination report the project of the State of New York for the construction of barge canal terminals on Lake Champlain was discussed. The bill referred to was passed by the legislature on July 24, 1911, and ratified by the people on November 7, 1911. The allotments made by this law for the construction of terminals at ports on Lake Champlain are as follows:

Rouses Point	$65,000
Plattsburg	100,000
Port Henry	100,000
Whitehall	90,000
Total	355,000

Plans for all of these terminals are being prepared, and on information received from the barge canal terminal engineer of the State of

New York it is expected that construction will commence and the work be completed at the various ports as follows:

Port.	Begin.	Complete.
Rouses Point	1913	1914
Plattsburg	1913	1914
Port Henry	1913	1914
Whitehall	1912	1913

The terminals are designed to accommodate barge canal traffic and to be adequate to meet the present needs of the various localities and to be susceptible of further development. The law also provides for the ownership and operation of the terminals at State expense, with provisos designed to prevent monopolization and discrimination by individuals or corporations. The law provides, further, for the construction of terminals at all important points on the barge canal system, and contracts have been let for construction at Albany and New York.

12. *Canadian connection.*—(See par. 25, preliminary examination report.) Work of improving the Canadian Chambly Canal at its present depth of 7 feet is now under way. Further than this, no material development can be reported in connection with the project for improving the connection between Lake Champlain and the St. Lawrence, though it is understood that the question is being given serious consideration again by the Canadian Government. (See par. 32.)

13. *Minor ports.*—A preliminary examination of the Great Chazy River, emptying into Lake Champlain 4 miles south of Rouses Point, has been ordered by Congress, but has not been made as yet. The situation at other minor ports has not altered materially since the submission of the preliminary examination report.

14. *Champlain and Erie Barge Canals.*—(See par. 24, preliminary examination report.) Work has been delayed on both these canals, though the State officials estimate that the Erie Canal will be opened in 1915 and expect that the Champlain Canal will be ready for operation by the time the Troy lock is completed. Most of the new locks on this latter canal are now ready for operation, and work is completed through the greater part of the canal prism.

15. *Commercial statistics, 1911, summary.*—The total commerce of the Narrows for the calendar year 1911 aggregates 825,975 tons, of which 504,386 tons were southbound and 321,589 tons northbound. Of this tonnage, 681,894 tons passed through the Champlain Canal and 144,081 tons were transhipped to and from rail connections at Whitehall. The foreign tonnage to and from Canada amounted to 502,262 tons, consisting principally of 263,069 tons of pulp wood and pulp and 53,016 tons of lumber imported and of 123,831 tons of coal and 28,933 tons of stone, lime, and clay exported. The shipments to and from New York lake ports aggregated 287,861 tons and those to and from Vermont lake ports amounted to 35,852 tons. The freight transhipped from rail to water at Whitehall consisted of 51,685 tons of coal, while the water to rail traffic was 92,396 tons of pulp wood and pulp.

The data for the commercial statistics for 1911 were compiled from the records of the canal collector at Whitehall for the canal traffic and from the books of the Lake Champlain Transportation Co. at Whitehall for the transshipment to and from rail connections.

Commercial statistics for the calendar year 1911.

VESSELS EMPLOYED IN TRADE IN 1911.

	Number.	Tonnage.	Draft.
			Feet.
Tugs and steamers	7	99–176	10–12
Sailing vessels	15	125	6
Barges and canal boats	600	100	5

FREIGHT.

	Short tons.		Short tons.
Coal	166,980	Lime, cement, etc	247,136
Lumber and timber	74,976	Pulp wood and pulp	266,884
Iron and iron ore	10,239	Miscellaneous	6,602
Wood	22,842		
Salt	743	Grand total	825,975
Hay	29,573		

16. *Distribution of commerce among lake ports.*—The distribution of this tonnage among the different lake ports tributary to the Narrows has not altered materially from that of 1910, as reported in the preliminary examination report. Attention is invited, however, to a serious error which has been discovered in the commercial statistics of the port of Plattsburg as given in the preliminary examination report and also for some years past in annual reports of the Chief of Engineers. This information has heretofore been obtained from officials of the United States custom service, and through inadvertence on their part the statistics for the entire port of entry, including Plattsburg, Rouses Point, and vicinity were given in such a way as to be taken for and reported as the commerce of Plattsburg. The discrepancy was not discovered until attention was invited to it by the secretary of the new chamber of commerce of Plattsburg in connection with a similar report obtained from the customs officials and submitted by him this year. From the best data obtainable since the submission of this report it is believed that the tonnage for the port in 1911 was as follows:

Plattsburg Harbor—Commercial statistics, 1911—Freight received and shipped.

	Tons.
Lumber (in barges and canal boats)	9,000
General merchandise (by steamers)	6,500
Total	15,500

Passengers carried, 124,761.
(Information obtained by G. M. Raynsford, United States inspector.)

III. A STUDY OF THE COMMERCIAL AND TRANSPORTATION SITUATION WITH A VIEW TO DEDUCING LIMITS OF PROFITABLE EXPENDITURES FOR IMPROVEMENT.

17. *General.*—In preparing a project for a public improvement it is conceived that the purpose in view is to secure to the taxpayers through the agency of the improvement the greatest ultimate benefit

attainable, both directly and indirectly; in other words, regarding the improvement as a business venture undertaken by the people, the object sought is the realization of a maximum net profit. With this object in view, there is a definite sum, the investment of which is more profitable than that of any other. If cost of improvement, physical results, changes resulting in transportation facilities, and the effects of these changes could be predicted with precision, the problem involved in preparing a project would be determinate. As a matter of fact, none of these elements is subject to precise quantitative or qualitative prediction and hence, as in every business venture, risks are involved, and the ideal solution must be approximated by the selection of the most obviously advantageous of various solutions studied. A conservative course is to make the ratio of probable gross earnings to interest on investment so great that, with ample allowance for uncertainties, the risk involved is reduced to the possibility of neutralizing net profits, and leaves little or no possibility of creating a negative balance. This is apt to result in an investment below that which experience will prove as the most advantageous and economical, and consequently in a reduction in benefits; but this is conceded as being preferable to any considerable risk of committing the people to ultimate loss. The physical characteristics of the Narrows are such that cost of improvement and physical results can be predicted with relatively close approximation to precision, but the conditions governing the effects on transportation and the amount and scope of benefits to be expected are unusually complicated and render predictions exceptionally hazardous. For this reason a policy of conservatism has been strictly adhered to in the discussion which follows.

18. *Limits of improvement.*—By reason of its remarkably simple regimen and the fact that the present open waterway flows, except at a few points, through a marsh between widely separated bluffs, the carrying out of improvement by deepening, widening, and straightening to any reasonable extent does not involve engineering problems of great intricacy, and only one of magnitude, viz, excavation; and the cost of the excavation require can be estimated closely. The problem in hand therefore has to do chiefly with commercial and navigation questions. Its solution lies in a comparison of readily estimated costs with a conservative estimate of benefits.

19. *Scope of improvement—Inferior and superior limits.*—The fact that commerce from the Champlain Canal must pass the Narrows to reach the "broad lake" would seem to fix as an inferior limit to the extent of improvement that which will just allow the movement of the biggest boats which can pass the locks of the new Champlain Canal. These locks will accommodate boats 300 feet long, 40 to 44 feet beam, of 10 feet draft, and of from 2,000 to 3,000 tons capacity. The next increase in the scope of improvement would be to make navigation as unhampered in the Narrows as it is in the open reaches of the canal. However, it is well known that open navigation is cheaper than the restricted navigation of a canal, and hence a maximum practical limit of improvement suggests itself as the creation of a channel of similar dimensions to those adopted for the southerly open approach to the canal, the Hudson River, where a channel 400 feet wide, 12 to 14 feet deep at lowest stage, and having no abrupt turns, is being constructed. The most suitable channel characteristics for the immediate improvement of the Narrows are to be sought between these

limits, having in mind a possible future necessity for the enlargement of the Champlain Canal.

20. *Measures of benefit.*—The simplest and perhaps the most reliable criterion of a minimum expenditure justifiable, is saving in cost of operation computed on the basis of existing traffic. This probably would be felt more in increased profits to existing transportation companies than in reduced rates. Such a basis of measure alone is not appropriate to this case, since there seems no reason to doubt that the opening of the Champlain Canal will result in the early elimination of the present type of craft and the substitution therefor of a much more economical carrier, with an attendant reduction in insurance charges, a lowering of through rates and the institution of strong competition. This should result in an increase in business; and the gross profits of this increased business plus saving in transportation on existing business then become a fair measure of benefit to be derived from the through waterway from the lake to the Hudson. Just what proportion of this benefit can be credited to the Narrows is problematical, but can be approximated by apportioning the benefit among the several sections of the waterway in proportion to their respective costs. Saving in cost of operation through the Narrows on the basis of the new business can be estimated and becomes another, though partial, measure of benefit. To reiterate, it is believed that gross profits on total value of resulting business plus saving in cost of transportation on existing business is the fairest measure of the benefit; since with any lesser included criterion the benefit to merchants, shareholders of manufacturing concerns, navigation companies, etc., and others to whom net profits accrue, alone is taken count of, and this is only a part of the benefit accruing to the entire population and community affected.

21. *Saving on basis of existing commerce.*—An analysis of cost of transportation and saving incident thereto, based on existing commerce, is given in inclosure A-1 to the preliminary examination report. In this analysis a very modest improvement of the waterway was assumed, little better than that required to allow a much hampered passage of barge-canal boats under unfavorable operating conditions. Based on actual experience in value of time lost with existing carriers and methods of operations, an annual saving to one transportation company alone of $8,000 is shown, which at 4 per cent, would justify an investment of $200,000. This is considered a minimum and partial estimate of benefits and, assuming that part of this saving can be applied to a reduction in rates and considering the money value of saving in time to shippers, it can be shown that an investment of $300,000 would be profitable without an improvement in type of craft or methods of operation. In view of the undoubted radical improvement in type of carrier, such an estimate is obviously an insufficient and unjust measure of profitable investment.

22. *Estimate of future commerce—Elements affecting.*—Increase in water-borne commerce accrues from two sources, viz, a transfer of existing traffic from rail to water and an exploitation of undeveloped resources. Probably the determining influence in creating both of these increments is transportation rates.

23. *Estimate of future commerce—Cost of transportation.*—The minimum cost of freight haul per ton-mile is a function of cost of operation of the carrier of original investment in plant and of incidental

charges. During the year 1910 an experimental vessel for use on Canadian waterways was given a very thorough trial in Europe. This boat was built of steel. She was approximately 240 feet long, 42½ feet beam, and about 16 feet depth molded, carrying a cargo of 2,000 tons on 10-foot draft. She was propelled by an internal combustion engine of 360 horsepower, using cheap fuel oil. She maintained a speed when loaded of 6¾ miles per hour. Her cost, though not known, is estimated at $100,000. It will be noted that this boat could pass through the locks of the Champlain Canal.

24. The limiting speed of a vessel on New York State canals is fixed by State regulations at 4 miles per hour. It is estimated that the full speed of the vessel can be developed in the Hudson River and on Lake Champlain. The estimated minimum time which is required for one lockage for a boat of this type is 20 minutes. The new Champlain Canal contains 12 locks. Assuming 3 lockages per hour, the daily lockage capacity is 72 per day of 24 hours.

The distances are:

	Miles.
Burlington to Whitehall	81
Whitehall to Albany	69
Albany to New York	150
Total	300

Based on these figures, it is assumed that this vessel, under favorable circumstances, could make the trip from Burlington to Whitehall in 15 hours, Whitehall to Albany in 22 hours, Albany to New York in 30 hours; total, 67 hours, or, say, 3 days.

Assuming 4 days as the time for loading and 4 days for the time for unloading, 6 days as the time for running, as stated above, 1 day as the time lost, and 200 days per year as the length of the season of open navigation, the vessel could make 13 round trips per annum between Burlington and New York, and transport a total cargo of 39,000 tons between these ports, running one way with a full cargo and one way with half cargo.

25. Assuming an initial cost of $100,000 and an annual interest on cost of 5 per cent, $5,000; an annual depreciation cost of 5 per cent, $5,000; an annual insurance of 2 per cent, $2,000; annual repairs, $500; miscellaneous expenses, $500; fuel, oil, waste, etc., $150 per trip, $2,000; wages, crew, and subsistence, $8,000; the total annual cost of operation would be $23,000.

Hence, to transport 39,000 tons between Burlington and New York would cost $23,000. The distance from Burlington to New York being 300 miles, the cost per ton would be 58½ cents, which is equivalent to $0.00197 per ton-mile.

26. It must be noted that this estimate does not include terminal charges and assumes cargoes ready, with no delay other than that involved in loading and unloading. It means cost and not rates or charges, since rates and charges involve profit and depend on existing conditions of trade, competition, etc. It is thought, however, that this represents basic operating expenses and forms an hypothesis on which to deduce probable rates for different classes of freight.

27. It should be noted that other types of boats may be adopted and in all probability will be used. When the barge canals were designed it was assumed that they would be navigated mainly by fleets of four boats, carrying about 1,000 tons each, the boats being of such dimensions that all four could be locked at one lockage. One

of these boats was assumed to be a steam-propelled vessel and the other three consorts. Based on boats of about these dimensions, Col. Symons computed the cost per ton-mile on the Erie Canal at $0.00088. A later estimate, made by one of the authorities of the barge canal reduced this cost to $0.0002 per ton-mile, using more modern boats and assuming 365 days' work in the year. It will be noted that the estimate given above is more conservative than either of these two.

28. *Estimate of future commerce—Rates.*—It is reasonable to assume, as a general rule, that the total revenue collected by transportation interests will exceed the total cost of transportation by whatever the public will stand. However, if the public is sufficiently determined to develop its resources, under existing law, it can regulate differentials and preferences and institute direct competition until rates will be brought to a point equal to costs plus a reasonable profit, such profit being fixed by the prevailing rate of interest at which money can be borrowed. As has been shown, the public, at least at Port Henry, is endeavoring seriously to secure reduced rates. Existing rail rates from Port Henry to New York are from $1 to $1.50 per ton on bulk commodities. Bearing in mind the probable actual future cost of transportation on the barge canal route between the Lake and New York City of from 30 cents per ton for low grade to 60 cents per ton for high grade commodities, as deduced above, it seems reasonable to assume that a rate of about 50 cents per ton can be secured on the route from Lake Champlain to New York City. Independent studies by the biggest shippers on Lake Champlain, the Witherbee-Sherman Mining Co. at Port Henry, have substantiated this conclusion, and its correctness is corroborated further by the known organization of a new transportation company to operate under contract with this shipper at about that rate. It is alleged also that a rate of 35 cents per ton on ore from Port Henry to New York has been offered provided an annual shipment of definite magnitude can be guaranteed.

29. *Estimate of future commerce—Port Henry.*—The most reliable statistics at hand are believed to be those concerning the commerce of the Port Henry district. Its output of ore for the last two years amounted to over 1,000,000 tons per annum. At present, at least, 90 per cent of this tonnage is marketed by rail, due to lack of transportation facilities by water as described elsewhere herein and in the preliminary examination report. Bearing in mind the length of the navigation season and assuming that rail rates on the commodity can not be lowered materially due to the actual cost of rail transportation, it is safe to assume that 75 per cent of the present output, or 750,000 tons, will be shipped by water when suitable facilities are afforded. This represents one increment of the probable increase in the water-borne commerce of the Narrows. Considering the prevailing market prices within its sphere of influence, the mining interests of Port Henry have estimated that with a 50-cent rate to New York, they can market in one year from 500,000 to 1,000,000 tons in addition to their present output; and, hence, it is thought that 500,000 tons may be taken as a conservative estimate of the increment to the increase in water-borne commerce due to development at this port. It will be noted that both of these increments affect the measure of benefit of the improvement, whether or not the railroads meet the water rate, since in any case the first increment is a measure of saving in cost of transportation on existing business and the second is a factor in the

value of future realization of benefits to accrue through the development of now unexploited resources.

30. *Estimate of future commerce—A typical port.*—Port Henry being almost solely a mining town can not be taken as typical of the lake ports. But Burlington, it is thought, may be taken as typical and, furthermore, as conservative. The conception of their city as a commercial and industrial center is apparently new to its citizens and is regarded by some with open skepticism. Nevertheless, the city is located well for industrial and commercial development and the resources of the State of Vermont, particularly the portion tributary to Burlington, are valuable and only partially developed, conditions which many of the business men are beginning to realize with a view to expansion and development. The water-borne commerce, exclusive of that carried by steamers for or after transshipment by rail at other lake ports, has increased during the past two years by about 10,000 tons or from about 80,000 to 90,000 tons, and the direct rail commerce is about 280,000 tons. A study of the character of this commerce leads to the conclusion that with a reduction in rates proportional to that expected for Port Henry, at least 150,000 tons of the present-day annual business will realize a saving of from 25 to 50 cents a ton in transportation costs due to the new water rate. A further study and analysis based on the investigation made by the Commercial Club of Burlington (see inclosure No. 1) makes it apparent that the establishment of low cost of transportation can be expected in the near future to create business involving the transportation in and out of Burlington of at least 100,000 tons of commodities per annum, principally in bulk commodities, or an increase of 25 per cent on the total present-day business.

31. *Estimate of future commerce—Other lake ports.*—As suggested above, Burlington as a commercial and industrial community is believed to be equally, if not more conservative, than any other on Lake Champlain. The balance of the territory tributary to the lake possesses, as does Burlington, valuable and only partly developed resources. For example, in the vicinity of Plattsburg are deposits of iron ore equal to the Port Henry deposits in quality and believed to exceed them in quantity. Abundant water power now undeveloped exists on the eastern slopes of the Adirondacks, and the farming country of Clinton County, N. Y., like that of Vermont, is fertile and well adapted to the raising of cattle for beef and dairy products. In view of these conditions, it is believed that the percentage increases deduced for the water transportation and business of Burlington can be applied safely to the present-day business of the other lake ports, and that larger percentages would be more nearly correct.

32. *Estimate of future commerce—Canadian traffic.*—The business considered in the foregoing paragraphs is essentially local and no account has been taken as yet of the Canadian water-borne traffic or that brought to the lake from Canada by the five railroads centering at Rouses Point. The present-day water-borne traffic with Canada amounts to from 300,000 to 500,000 tons per annum. As mentioned in paragraph 12, the Canadians now are improving the Chambly Canal and the project for a 14-foot canal is and has been backed by the present opposition party in Canadian politics. All things considered it is believed that the Canadian water-borne traffic will far exceed in time that originating in the lake ports, and may render

necessary the enlargement of the canals between the St. Lawrence and the Hudson. This traffic once established, the business of the railroads centering at Rouses Point seems destined also to increase. In short, it is believed that in the future the importance of the Narrows will be measured principally by its service as a link in the through, direct transportation route connecting the greatest commercial centers of the United States and Canada. But the elements affecting this traffic are so diverse, complicated, and problematical that a comprehensive quantitative analysis at this time would be too unreliable to be worth undertaking. However, it seems inevitable that a reduction in water rates of 50 per cent or more between the lake and New York and the improvement of the Champlain Canal will result in some increase in foreign trade under the existing conditions regarding the Chambly Canal, and an estimated increase of 10 per cent on existing commerce is deemed conservative.

33. *Estimate of future commerce—Elements summarized.*—A computation now can be made of the probable future commerce of the Narrows. The elements of tonnage making up this commerce will be taken as (1) present commerce; (2) Port Henry business now carried by rail; (3) new business, Port Henry district; (4) business from the lake ports now going by rail; (5) new business other ports and Canada.

(1) The present commerce is about 800,000 tons.

(2 and 3) As described in paragraph 29, about 750,000 tons of the present Port Henry business can be expected to follow the water route and about 500,000 tons of new business is anticipated.

(4) The total rail business of Burlington is given in paragraph 30 as 280,000 tons, of which at least 170,000 tons parallels the route through the Narrows. The total rail business of the Plattsburg custom collection district is not less than 300,000 tons, at least 150,000 tons of which parallels the Narrows route; 100,000 tons can be taken as a conservative estimate of business of other districts having access to the lake, making a total present-day rail business paralleling the Narrows route of about 420,000 tons per annum. Assuming that only 25 per cent of this seeks the water as the result of reduced rates, we have about 105,000 tons as a conservative estimate of the portion of the present-day rail business which will be carried by water.

(5) Present Canadian traffic is about 400,000 tons. Present-day traffic with Port Henry is about 10,000 tons. This leaves 390,000 tons as the present-day commerce from other lake ports. Assuming an increase of 25 per cent for lake ports as indicated in paragraph 30 and 10 per cent on Canadian traffic, we have as the new business from lake ports and Canada something over 130,000 tons.

34. *Estimate of future commerce.*—Totaling the above elements, the following estimate of the annual commerce through the Narrows to be expected as a result of the improvement of the Champlain-Hudson route is arrived at:

	Tons.
(1) Present commerce	800, 000
(2) Port Henry rail to water	750, 000
(3) Port Henry new business	500, 000
(4) Other ports rail to water	105, 000
(5) Other ports new business	130, 000
Total	2, 285, 000

Everything considered, this estimate is believed to be extremely conservative, taking count of such increases only as are now definitely in sight or seem inevitable in the near future. A development of the iron ore near Plattsburg, an exploitation of New York and Vermont granite, or the creation of any considerable cattle-raising industry would result in a further increase of 1,000,000 or more tons in annual traffic, omitting again any considerable increase in through traffic with Canada.

35. *Estimate of benefits.*—On the theory that the benefit due to the improvement of the through waterway is measured partly by the saving in rates on that part of existing commerce which secures the benefit of reduced rates established through its agency, whether or not such commerce is water borne, and partly by the value or gross profits of new business created as the direct or indirect result of the reduction in rates, a computation of the pecuniary value of the benefit now may be made. The total estimated existing commerce to realize the benefit of reduced rates and be carried by water consists of items 1, 2, and 4 listed in paragraph 34, or 1,655,000 tons. The major part of this consists of low-grade commodities, and it will be on the safe side to assume a saving in rates on its carriage of $0.50 per ton, or about $830,000 per annum. Half as much can be estimated conservatively as being carried by rail at rates determined by water competition and representing a saving of $0.25 per ton on existing rates, making an additional increment of about $200,000. As stated, the new business probably will be largely in bulk commodities, iron ore, coal, lumber, pulp wood, etc., and it is believed that its average gross value will be in excess of $4 per ton. Measuring the new business by items 3 and 5, and adding 70,000 tons as a conservative estimate of new business brought into existence by the creation of the water rate, but carried by rail, we have the creation of about 700,000 tons of new business valued at $4 per ton, or an annual benefit thereby of $2,800,000. Recapitulating, the annual pecuniary benefit is then:

1. A saving of 50 cents in transportation of 1,655,000 tons, or about......	$830, 000
2. A saving of 25 cents in transportation of 800,000 tons, or about.........	200, 000
3. New business, 700,000 tons, valued at $4 per ton, or about..............	2, 800, 000
Total..	3, 830, 000

This figure will be taken as a conservative estimate of the annual pecuniary return to accrue to the taxpayers as a result of the creation of a barge route from the Hudson to Lake Champlain.

36. *Proportion creditable to Narrows—Method of determining.*—As just stated, this figure does not represent the saving due to the improvement of the Narrows alone, though without some improvement thereto it is probable that only an insignificant part of it can be realized. The hypothesis on which the estimate is based is simply the opening of the through waterway to barge canal traffic. From the nature of the computation the estimate is general and does not admit of refinements to cover varying degrees of improvement to the Narrows, but as indicated above it is believed, however, to be essentially conservative. The next step is to endeavor to indicate what portion of this benefit is creditable to the improvement of the Narrows of Lake Champlain.

37. *Proportion of benefits creditable to Narrows.*—The Champlain Canal will have cost the State of New York $12,000,000. Assuming an interest charge of 4 per cent, the annual cost to the taxpayer is $480,000. It is believed that more than one-third of the traffic of the canal, measured by its value, will be between ports on the canal and points south, leaving a charge proportional to this division of traffic of $320,000 per annum to be borne by the through Champlain route. While it is believed that the realization of benefits is not entirely dependent on the construction of new terminals, nevertheless, for the sake of conservatism, it is thought proper to charge the cost of terminals on Lake Champlain to the cost of the through route. As indicated in paragraph 11, the terminals on Lake Champlain to be built by the State of New York are estimated to cost $355,000. Adding $100,000 for municipal and other terminals, we have a total of $455,000, or, at 4 per cent, an annual interest charge of $18,200 for terminals, making the total annual charge against the through waterway, exclusive of the cost of improving the Narrows, about $340,000. If benefits creditable to the different sections of the through waterway from the lake to the Hudson are to be apportioned in the ratio of the costs of the respective sections, the lower the cost of any section the smaller the benefits attributable thereto. The cost of making any improvement to the Narrows worth undertaking will exceed $200,000, and for the purpose of apportioning the benefits this sum may then be taken as its cost. The annual interest on $200,000 at 4 per cent is $8,000, and the annual interest charge on the entire waterway then becomes $348,000. On this assumption the charge against the Narrows is $\frac{8000}{348000}$, or $\frac{1}{43.5}$, or 2.3 per cent of the total cost, which fraction represents the portion of the total benefits creditable to the Narrows.

38. *Resulting estimate of profitable expenditure.*—In paragraph 35 the total annual benefit was estimated as $3,830,000, $\frac{1}{43.5}$ of which is $88,045.98. On the assumption that benefits are proportional to cost, a low estimate of annual benefits creditable to the Narrows is therefore $88,000. This, at 4 per cent, represents a profitable investment of $2,200,000, or, at 3 per cent, of about $2,930,000 for the improvement of the Narrows.

39. *Another estimate.*—Though its elements are all believed to be conservative, the foregoing method of deducing the profitable investment for improvement may be considered as too indirect. In paragraph 21 a very modest improvement of the Narrows was estimated to effect a saving in cost of transportation of $8,000 per annum on a commerce of about 750,000 tons, or $0.0106 per ton, using the small boats of the present day. With a commerce of 2,285,000 tons (par. 34), the saving at this rate would be $24,221 per annum. This, at 4 per cent, represents a profitable investment of about $600,000, and at 3 per cent of $800,000; but, as shown above, this is based on only a partial measure of benefits, and hence is further from precision than the larger estimate given in paragraph 38. Further, it is inconsistent, since the future volume of commerce is based on the use of large boats and the rate of saving per ton on the operation of present-day small boats.

40. *Conclusion as to justifiable expenditure.*—The foregoing study of pecuniary value of benefits to be derived from improving the Narrows shows a justifiable expenditure of from $600,000 to

$2,930,000, with no guide as to the exact amount most desirable, and hence it appears that the scope of improvement must be determined by a study of navigation conditions.

IV. STUDY OF NAVIGATION CONDITIONS WITH VIEW TO DETERMINING SCOPE OF PROJECT.

41. **GENERAL.**—The bulk of existing and prospective traffic on the Narrows of Lake Champlain is in freight. Nevertheless, conditions are such as to render possible in the future a commercial value of passenger traffic through the Narrows. For reasons closely similar to those set forth in the report on the preliminary examination of the Hudson River referred to in paragraph 8, the most desirable depth is believed to be 14 feet at low-lake level. The reasons for adopting this depth on the Narrows are in one respect more cogent than in the case of the Hudson. On the Hudson the daily tidal variation and the occurrence of freshets secure the prevalence of depth greater than that of the project for a part of each day and for longer periods at intervals. On the Narrows an elevation about one-half foot above the plane of low-lake level is maintained usually each year for from two to three months. (See par. 6.) Thus in the Hudson a depth of from 14 feet to 16 feet is available almost daily with a 12-foot project, while in the Narrows a depth only slightly in excess of the project depth would prevail continuously for about one-third of the navigation season. Four hundred feet was considered the minimum width necessary for the free and safe passage of tows in the Hudson, but with the present commerce of about 5,000,000 tons per annum this width is proving dangerous with boats of too great draft to leave the main channel. The prospective commerce of the Narrows is believed to require for safety a similar width. South of Albany the least radius of curvature of the center line of the channel in the Hudson is 4,900 feet. The Hudson and the Narrows are part of the same waterway and their present and prospective freight traffic are similar in character. In view of these conditions, a channel 14 feet deep, 400 feet wide, and having a least radius of curvature of 4,000 feet is deemed requisite for the Narrows. Such a channel would involve an almost continual encroachment into the marshes bordering the free waterway, and if full width be maintained throughout, would require extensive rock cutting, and its cost greatly exceeds the inferior limit of justifiable expenditure deduced in the last chapter. Hence this project will be regarded as the ultimate limit of improvement probably necessary in the future and as adequate for all foreseeable needs until the depth of the new barge canal shall be increased beyond 12 feet, and as such will be borne in mind in the designing of a lesser project with a view to the economical extension of such lesser project in the future.

42. *Elements of channel design defined.*—A general study of the elements of channel design has led to the assumption of specific channel characteristics, defining the most comprehensive improvement, the necessity for which can be anticipated without a radical alteration in existing conditions; and it has been shown that the cost of this improvement is too great to warrant its adoption in a project at this time. A more detailed study of those elements now must

be made to determine the characteristics of a lesser improvement which should be undertaken at once. The elements of design which must be studied in detail are type of carrier, number of trips or degree of congestion of traffic as fixed by the volume of traffic, and depth, width, and curvature of channel required to accommodate these carriers in the number expected. Volume of traffic in tons has been assumed, namely, 2,285,000 tons per annum, and, as will be shown, curvature and width must be considered in the relation they bear to each other.

43. *Elements of channel design—Type of carrier.*—As stated hereinbefore and in the preliminary examination report, the characteristics of craft which will perform the bulk of the service in the new waterways of the State of New York, are the subject of little that is more definite than speculation. Many, if not the majority, of the men now engaged in the transportation business have no fixed ideas on the subject and are "waiting to see." Among those who have convictions in regard to it, opinions are diverse and conflicting. One concern prospecting with a view to carrying ore for Port Henry mines proposes to try out a self-propelled barge of the maximum over all dimensions, which can be locked through the canal, but with a draft of only 6 feet. It is understood that in designing the barge canal locks, the general adoption of a boat about 150 feet long, 40 feet beam, and drawing loaded 10 feet, was anticipated, with the expectation that these boats would be handled in fleets of four, propelled by power installed in one of them and that they would be locked two at a time. Only one thing seems to be conceded generally—the probable elimination of the present type of canal boats; and even so towing interests generally assume that most of the new craft will be not self-propelled and will be handled wherever possible in fleets by towboats. As a general proposition, it seems that the greatest economy can be secured through the use of maximum unit cargoes when commodities are available for transportation in sufficient quantities, a condition which would seem to obtain on the Narrows, at least with Port Henry ores and with pulp wood. It is also significant that the size of the present boats is the maximum which can be locked through the old canals. Further, the newest and most efficient cargo carriers now navigating the Hudson River are the steel barges of the Standard Oil Co., with dimensions and draft close to the maximum which the new locks will accommodate. All things considered, it is believed that a grave mistake would be made in designing the new channels for boats less than 300 feet long, 42 feet beam, and drawing 10 feet loaded, and that the towing of these boats singly and in fleets should be permissible.

44. *Towing.*—With regard to towing, the following is significant. With good models, molded hulls handle better than box or scow hulls. The former can be handled most economically on a single long hawser, and in restricted channels, the latter can be maneuvered with precision only when the tug is alongside. In crooked channels, boats towed on a hawser are more managable when two abreast than when in line ahead. Economy in traction varies directly and manageability inversely with the length of hawser. With the present canal boats, sharp curves in the canal are taken by two boats in line ahead by controlling the angle between their axes with double lines connecting pairs of boats and operated by a hand winch on the

forward boat. This is not done with fleets on the Narrows, and is not possible with large boats, because of the great strains placed upon the lines and winches. For economy in tractive effort the small boats are now handled through the Narrows and on the lake by a single powerful tug in the largest tows possible, but usually not more than 20 boats to a tow. From practice in the Hudson and around New York, it appears that from 2 to 4 boats is the limiting size of tows for a single tug where boats of over 1,000 tons burden are handled.

45. *Elements of channel design—Congestion of traffic.*—The total annual tonnage to pass the Narrows in the near future has been assumed to be about 2,285,000 tons. Based on present-day operations and the influence of the Port Henry mines, more than two-thirds of this may be expected to move from north to south, resulting in the movement of a considerable number of light boats from south to north. Neither the percentage of full cargoes passing in both directions nor the carrying capacity of craft can be predicted. Hence, in determining the number of passages, it seems safe to assume an average cargo of 1,000 tons. With a navigation season of 200 days, this would mean the passage of the Narrows by an average of 12 boats per day. Since this average will not be maintained from day to day, it seems reasonable to assume that the channel should be designed for the movement of 24 large boats in a day or an equivalent number of smaller boats. With present-day practice as a precedent and in view of the lighting system installed in the new canal, it is anticipated that commerce will move largely by night.

46. *Elements of channel design—Depth.*—A depth of 12 feet is provided by the barge canal, which is designed to accommodate a draft of 10 feet. This would fix the minimum depth required in the Narrows as 12 feet. As suggested above, studies of tractive effort and clearance made in connection with the Hudson indicate the wisdom of providing 14 feet depth for 10 feet draft, and this is the depth set in the "ultimate project." Twelve feet, however, will allow the movement of traffic, and in view of the area of soft excavation involved, would affect a material saving. All things considered, it is believed that in any project to be adopted a depth of 12 feet should be provided in soft excavation, and of 14 feet in rock where rock is found above the 12-foot plane.

47. *Elements of channel design—Width and clearance.*—With the present type of canal boats handled in fleets by powerful tugs, the problem of navigating in a channel of restricted width is simplified by the fact that the boats can be allowed to rub and bump each other in passing, and touch the shore and bottom in rounding curves. In the latter operation, they often are pulled through soft mud along the banks whose resistance to lateral motion is sufficient to make them follow the edge of the channel. This is all possible because of the small weight of the boats, their great stiffness in relation thereto, and their small momentum when at low speeds. The loaded displacement of one of the present-day boats is about 250 tons, while that of one of the new boats on 10-feet draft is about 3,900 tons, or about 16 times as great. The momentum of the new boats then will be such that rubbing or bumping must be prevented, and that they can not be allowed to run into soft material on the side slopes of the channel without risk of being stuck fast. Consequently, a safe

working clearance must be maintained between boats and between them and the lines defining the limits of full depth in the channel.

48. *Elements of channel design—Width—Straight reaches.*—To pass in still water in daytime with no wind, with boats in single column, in straight reaches with careful handling, a clearance only slightly in excess of the width of the boat plus its maximum normal deviation from the course moved in is sufficient. Boats 44 feet wide can pass the locks, but, as stated, 42 feet is taken as the standard beam. With such boats, a channel width of 110 feet would be sufficient, theoretically, to allow passing under conditions named. With any wind abeam, the axis of a self-propelled boat makes an angle with her course, increasing with the velocity of the wind. Similarly, under wind conditions, a barge under tow of a tug requires more room, and two barges, one towing the other, still more room. The room required varies directly with the freeboard and inversely with the load, though the damage involved in ramming or grounding increases with the latter. An attempt has been made to present in inclosure No. 3, illustrated by the diagrams in inclosures No. 3a, a brief analytical quantitative treatment of some phases of the subject of channel width, curvature, and clearance. Specific cases under stated assumptions are worked out for wind velocities of 9 and 15 miles per hour, the former being the mean prevailing velocity mentioned in paragraph 8 and the latter the maximum under which it is expected that navigation will be carried on without interruption. Greater velocities will require unusual skill and care in navigating, and are disregarded as exceptional. Generalizing from the conclusions drawn in inclosure No. 3, it may be said that, with any wind, boats singly or in tow of a tug, or two boats, one towing the other, deviate from the course of the towing craft to such an extent that a clearance, equal to the width of the boat, between boats and between boat and channel limits, becomes necessary for safety, and a channel 200 feet or more in width is requisite on straight reaches. At night all the above conditions are aggravated and risk of striking or grounding becomes more acute.

49. *Elements of channel design—Curvature and width.*—As stated, the discussion in inclosure 3, deals also with curvature in relation to width. Under the conditions mentioned in the first sentence of paragraph 48, it is theoretically possible, as shown by plate 3a, for two 300-foot boats to pass each other with 10 feet clearance on a curve of 1,300 feet radius in a channel 172 feet wide. This width must be increased to allow passing of single boats when any wind prevails, and, to a greater extent, to allow the passing of boats under tow. Referring to the figures of inclusure 3a, it is apparent that the channel width must be increased at curves to at least 318 feet on a curve of 1,300 feet radius. A larger or smaller radius of curvature decreases or increases the necessary channel width proportionally. Though the channel widths given are deemed the minimum practicable and are safe theoretically, passing will require much nicety in handling that, to a practical boatman, the existence of grave risks by day, enhanced by night conditions, is still apparent. (See inclosure No. 4.) If passenger traffic is ever to become of importance, much greater width must be provided to allow a very modest degree of safety in operation.

50. *Widths and curves—Conclusions.*—In the Narrows, local winds of varying intensity, direction, and duration, and often in the nature

of sudden squalls, induced by the configuration of surrounding hills, are regularly prevalent. As stated, boats will be handled at least to some extent under tow, and operation at night will be a necessity. Under the circumstances, a minimum width of 200 feet on straight reaches, increasing at curves to about 290 feet for a radius of curvature of 2,000 feet on the center line of the channel (except where the length of the curve is short), is believed to be necessary and requisite. Any sharper curves are most undesirable for other and obvious reasons.

51. *Cut-offs.*—Most of the widths and curvatures described in paragraph 50 preceding could be secured, except near the Elbow and the Narrows near Dresden, by following the present course of the channel, widening into the marshes when necessary and cutting into the convex shore sufficiently at all curves. For the 400-foot channel set as a standard, cut-offs through the marshes at other points are obviously necessary or advantageous and economical. With this in view, cut-offs seem advisable at the following points, whatever the channel adopted: Maple Bend and Chiltons Bend. Further, because of the rocky character of the bank and the prevailing winds, a cut-off at Cedar Mountain is desirable also. The Elbow presents a special problem. The radius of curvature is so small and the length of the curves of the existing channel at this point are so great that a radical deviation from the present channel is necessary in any case.

52. *Conclusions as to requisite channel characteristics.*—As a result of the study of the elements of channel design outlined above, a depth of 12 feet in soft excavation and of 14 feet in rock where encountered above the 12-foot plane, a bottom width of 200 feet on straight reaches, a minimum radius of curvature of about 2,000 feet, a maximum width at curves of 290 feet, changing in inverse ratio to the radius of curvature and modified as necessary to suit the length of the curve, and the creation of straight reaches wherever desirable and economical in view of future extension of the improvement, are considered as the proper channel characteristics of the present project for the improvement of the Narrows. In addition, for practical reasons incident to carrying on the excavation and to navigation, it is believed that the theoretical curves should be secured, when practicable, by laying out the channel lines in short, intersecting tangents, nclosing the curves, especially on the convex bank.

V. RECOMMENDED PROJECTS.

53. *General description.*—The characteristics described in paragraph 52 are embodied, as far as practicable, in the following project. The approximate bottom limits of the proposed channel are shown by broken red lines, on charts 1–5 inclusive.[1] A bottom width of 200 feet or more is maintained throughout, except for a distance of about 500 feet between Putts Rock and Putts Leap, where the bottom width is reduced to a minimum of 150 feet. To maintain the full width of 200 feet at this point would require the excavation of 13,700 cubic yards of ledge rock at a cost of about $50,000 from the sides of the channel. It is believed that this excavation will become necessary in the near future, and should be done under a revision of

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[1] One sheet only is printed

the project whenever the absolute necessity therefor has been demonstrated. The length of the reduced section is short, and this locality being so near Whitehall and protected by high bluffs from lateral winds it is thought that with sufficient care and some inconvenience traffic may be handled so as to obviate the necessity of passing at this point. Accordingly, in view of the relatively high cost of rock excavation, the channel is narrowed as shown; but the installation of strong fender booms or other timber protection is provided for as a temporary means of avoiding serious accidents by collision with the rocky shore. The proposed channel has a uniform depth of 12 feet and does not involve rock excavation, as rock is not encountered above the plane of 12 feet below low lake level. Cut-offs and curves are laid out with the regard to the principles described above. The cut-off at Chiltons bend is particularly important, since wind conditions make the rounding of Pulpit Point the most hazardous operation incident to present navigation. It will be noted that this cut-off takes advantage of the existing bayou or slough. Throughout the channel, side slopes of 1 on 5 are provided wherever the banks are of soft material.

54. *The Elbow.*—The solution adopted for the problem met at the Elbow is the one which, all things considered, seems most desirable. Three widely differing methods of treatment were considered: (1) The cut-off recommended for adoption; (2) to follow the present channel from Whitehall to the Elbow and there make a cut directly through Putts Rock; and (3) to follow the present channel from Whitehall to Ref. 5+550, and there make a cut-off through the marshes along the course indicated by the broken line. The second scheme is more expensive than the one recommended for adoption, does not provide as easy curves, and for these and other reasons was discarded. The third scheme is the least expensive of the three in first cost, but was not incorporated in the project for the following reasons: (*a*) The present narrow channel leading out of Whitehall Harbor is followed and because of existing docks and high property values can not be widened except at great cost; (*b*) this channel is often partly blocked by boats lying at the docks, a condition which can be remedied only by buying up the property at great cost; (*c*) the cut-off does not give as easy curves as the alternative incorporated in the project; (*d*) without a radical change in methods of operation Whitehall will remain the point for making up tows for the lake and breaking them for the canal, and, in any event, boats awaiting lockage must lie in the harbor, and in view of these facts the harbor room should be increased if practicable (see inclosure 4); (*e*) should an increase in the capacity of the waterway become necessary in the future, the abandonment of the short cut-off and a recourse to the recommended channel probably would be necessary, involving a considerable increase in ultimate cost. The channel incorporated in the project is open to none of the foregoing objections; it increases the harbor room directly, opens valuable riparian property for dock purposes, and allows the use of the present channel for harbor space and as a by-pass for small vessels.

55. *Fender booms and maintenance.*—To avoid danger of collision with the bluffs at the Narrows near Dresden, Pulpit Point, Putts Rock, Putts Leap and Cedar Mountain, the installation of fender booms is provided for, these booms to be maintained until experience

demonstrates that they are no longer necessary. While there is little deposit of material brought into the channel as suspended matter, a certain amount of bank degradation can be expected and it is thought that an annual charge of $5,000 for the removal of material carried into the channel thereby and for repairs to the fender booms will be required for the maintenance of the project.

56. *Quantities and character of work.*—The total amount of soft material to be excavated, including side slopes and 1 foot overdepth cutting, is approximately 5,000,000 cubic yards. About 38 per cent of this will come from cut-offs where the entire channel passes through the marsh, and involves a cut of from 12 to 15 feet in depth, with a slightly deeper cut on the south side of the hill on Cook Island. About 20 per cent of the material comes from areas included between the existing marsh line and one or other of the lines limiting the bottom of the channel at points where the channel bottom encroaches on the marsh, and requires a cut from 12 to 14 feet deep. About 6 per cent of the material is in subaqueous excavation in the cut-off at Chiltons Bend, with a depth of cut of from 2 to 10 feet. The balance of the excavation (36 per cent) is subaqueous channel and side slope work with a depth of cut on the center line of the channel of from 0 to about 3 feet. All of the material to be removed can be handled readily by a hydraulic dredge, and disposed of within pumping distance. About 15 acres of thinly wooded land and 25 acres of brush is included between the side slopes. The timber should be cut and stumps grubbed, and the brush cut off ahead of the dredge. North of the Elbow the bottom of the channel lies along timber bulkheads for a distance of about 3,000 feet. These bulkheads were built by riparian owners for dock purposes and are in a more or less dilapidated condition, requiring their repair by the owners to prevent them from falling into the new channel.

57. *Methods and unit prices.*—As stated hereinbefore, the excavation is peculiarly well adapted to hydraulic dredging, and the quantity involved is sufficient and the depth of cut such as would warrant, under conditions obtaining elsewhere than on Lake Champlain, the expectation of securing low unit prices from contractors. For the next three years floating plant of any size can not be brought into the lake except from the finished sections of the barge canal. Consequently if plant is not to be constructed expressly for this work and plant of a size consistent with economical work is to be used competition will be limited to contractors now operating on the Champlain Canal and north of Fort Ann, to the south of which the canal is still closed to the passage of anything except small canal boats. Only one hydraulic dredge of large capacity is know at this time to be on this part of the canal, and it is doubtful whether a bid for its services could be secured except at an uneconomical figure. The advisability of investigating the cost of construction and operation of Government plant in determining unit prices then becomes apparent. As will be shown in paragraph 63, it is estimated that a 20-inch suction dredge can be built on the lake for $100,000. If this cost be borne entirely by this project, the cost for plant per cubic yard for 5,000,000 cubic yards of excavation is 2 cents. In good cutting, well cleared of roots, snags, etc., the maximum output of the dredge should be 20,000 cubic yards per day of 24 hours. If the working season is assumed at 200 days and the maximum output could be maintained,

he time required to complete the work would be a little more than ne year. Making full allowance for breakdowns, the removal of tumps, snags, etc., it seems safe to estimate that the work can be ompleted with the dredge in commission for 600 days of 24 hours ach. The daily cost of maintaining the dredge in commission, ncluding repairs, whether or not she is working, should not exceed 400 and when not in commission $30. The total cost of operation or three calendar years would then be $256,000, or the cost per cubic ard of dredging 5,000,000 cubic yards, exclusive of first cost of plant, ould be $0.052. Adding a cost of $0.02 for first cost of plant, the otal cost per cubic yard should not exceed $0.075. Some salvage alue should remain in the plant at the close of the work. Unit rices for dredging under contract heretofore done on Lake Cham- lain range from $0.108 for work done about 1889 to $0.295 paid in 912, with $0.20 as the lowest paid in late years, all on relatively mall jobs. The least price paid for similar work on the Erie Barge anal was $0.21. All things considered, it is doubtful whether a rice less than 15 cents can be obtained under contract at this time. n view of the discrepancy between this figure and the estimated ost of doing the work with Government-owned plant and to insure ufficient funds for the completion of the project, $0.125 per cubic ard will be used in the estimate of the cost of the project. Making ue allowance for the difficulties attending the work of clearing along he edge of the marshes, a price of about $45 per acre will be assumed or all the work of clearing and grubbing required.

58. *Land required.*—The proposed channel lines near Whitehall ut off a considerable area from direct communication with the main- and, and the owner considers that practically all the present value f the land to the west of the new channel will be forfeited thereby. He therefore values the whole plat, including the area required for he channel and that lying between it and the present channel, at 25,000, and if the island were left in his possession would not make sufficient reduction on the right of way to offset the cost of the ridge which the United States would then have to build. The urchase of the whole plat at $25,000 is therefore considered advis- ble. The cut through the marsh at Maple Bend lies in the State of ew York, while the cut at Chiltons Bend lies in the State of Ver- mont. The land in these cuts is practically valueless, and it is believed that $35,000 will cover the cost of purchase of all land required.

59. *Estimated cost.*—The estimated cost of the project, based on the foregoing prices, is as follows:

Excavating 5,000,000 cubic yards of soft material, at $0.125 per cubic yard, place measurement	$625,000
Purchase of land	35,000
Clearing and grubbing	1,500
Placing new fender booms	10,000
Engineering and contingencies	65,500
Total	737,000
Annual cost of maintenance	5,000

60. *Conclusion as to adoption of project.*—The foregoing project is believed to be conservative, efficient, and economical, and the least expensive which will meet the needs of the waterway in the immediate future and allow the proper development of its usefulness. In

consideration of the estimates of pecuniary value of benefits to be derived from the improvement given in Chapter III and the above estimated cost of the project, the expenditure involved is deemed justifiable and requisite; and the adoption of the project is accordingly recommended.

VI. EXECUTION OF PROJECT.

61. *Order of work and rate of progress.*—It is expected that the Champlain Barge Canal, including the lock and dam at Troy, will be completed ready for operation at the opening of the navigation season of 1916, and the improvement of the channel through the Narrows should be completed at the same date. A large hydraulic dredge should be able to do this work in two seasons by working continuously day and night during the open season on the lake, provided funds are available. Allowing for delays, three years is taken as the time required to complete the project. It is proposed to commence operations at the cut-off at the Elbow, to be followed by the cut-offs at Chiltons Bend and Maple Bend in the order named, leaving the open excavation and bank cutting to the last. This program would be modified as necessity required in connection with the acquirement of land, negotiations for which would be begun immediately on the adoption of the project.

62. *Appropriations.*—The initial appropriation should be not less than $300,000, with a proviso authorizing the construction of a hydraulic dredge and accessories if reasonable prices cannot be obtained under competitive bidding, and containing also a provision for the letting of a continuous contract in an amount not to exceed $737,000. The balance of the funds estimated to complete the project should be appropriated as needed, and on the completion of the project funds necessary for maintenance, estimated at $5,000 per annum, should be provided when required.

63. *Itemized estimate of cost of plant.*—The following itemized estimate of the cost of constructing Government owned plant, to complete the project is given:

1 20-inch suction dredge:	
House and hull	$24,000
Boilers (2), engine, pump, condenser, and fittings	31,000
Swinging engine and accessories	6,500
Ladder and "A" frame	6,000
Cutter engine, shaft, and shaft head	2,500
Lighting plant	1,500
Anchors, iron, running gear, paint, and equipment	5,000
Total	76,500
1,000 feet[1] pipe line complete with pontoons, etc	10,000
1 tugboat, 1 launch, and scows	13,500
Total	100,000

This estimate includes all cost of transportation, labor, design, and incidentals.

64. *Acquisition of land.*—The land which must be acquired lie in the States of New York and Vermont. It is considered that i would be to the advantage of the States concerned and of the United

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[1] 95 per cent of the work can be done with this length of pipe. A longer pipe will be required for work immediately north of the Elbow It is proposed to rent extra pipe for this when required.

States, if title were secured by the States or necessary right of way granted to the United States to allow the excavation of the channels. This is a matter upon which the district officer has been unable to obtain definite action or opinions from State officials, and is one which it is believed must be adjusted by higher authority, if at all. In any event, the necessity for a prompt commencement of the work of improvement is so urgent that this matter should not be allowed to cause delay.

VII. SUMMARY OF CONCLUSIONS.

65. To recapitulate, it is believed:

(1) That all work should be designed to fit ultimately a project providing a width of 400 feet, a depth of 14 feet, and no bad curves.

(2) That a 200 feet project with 12 feet depth is advisable, justifiable, and requisite at this time, and such a project is presented and recommended for adoption at an estimated cost of $737,000.

(3) That this project can and should be completed in three years, and an initial appropriation of $300,000 is requisite, with continuing contract authorization, for the balance of the project.

(4) That the work should be done under one contract or by Government plant, depending upon prices received on competitive bidding.

66. *Related subjects.*—The related subjects, such as wharfage, movement of traffic and traffic connections, etc., which are not covered by this report have been treated in the preliminary examination report submitted May 19, 1911. Such snagging as may be needed is included in the estimate for dredging. No water-power development is possible.

67. *Inclosures.*—A list of inclosures follows:

Inclosure No. 1. Letter from secretary Commercial Club, Burlington, Vt.
Inclosure No. 2. Letter from secretary Chamber of Commerce, Plattsburg, N. Y.
Inclosure No. 3. Studies relative to width and curvature, with plate marked 3a.
Inclosure No. 4. Letter from Ulster Davis, Albany Towing Co.

W. M. BLACK,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

[Inclosure No. 1.]

From: Secretary of Commercial Club, Burlington, Vt.
To: Capt. R. D. Black, Corps of Engineers, United States Army.
Subject: Burlington, Vt., commercial statistics.

On January 15 the following questions were mailed to manufacturers, merchants, and professional men in northern Vermont with the explanation that the cost of hauling freight to New York City by barge through Lake Champlain and the New York State Barge Canal would be between 3 and 4 cents per 100 pounds.

1. Under these new conditions of lower freight rates by water, what will be the probable expansion of trade and industry in northern Vermont, using Burlington as a gateway by rail and water?

2. What is your opinion with respect to the possible or probable establishment of new industries?

In general the replies indicate an increase from 25 to 100 per cent, according to the class of business, and in a few cases fourfold. Only one reply was received adverse to the general opinion that the increased facilities for water transportation would be of great and lasting benefit to this section of New England, as it would facilitate the receipt of raw materials and food products and the shipments of finished goods to and from the West and South, with more even chance in competition with other localities now favored with low-water transportation freight rates. It is also throught that, in order to finally get the best results from water transportation, a barge canal should be finished connecting Lake Champlain with the St. Lawrence River.

The replies to the second question as to new industries: The opinion seems to be that as Vermont has already in the last few years begun greater activities in the establishment of agricultural schools, in building better highways, new and better hotels, shows there is a general awakening of the people along these lines, and that with lower freight rates and good facilities for receiving and shipping, with low terminal charges, there will be a large increase in the establishment of new industries. A new waterway with large barges, especially if same could be run on such schedule as to insure regularity and promptness of delivery, will probably be the largest factor in establishing many new industries at or near Burlington for finished products, such as granite, marble, slate, wood novelties, handles, and inside house finish.

SPECIAL INDUSTRIES.

For the different trades the replies indicate as follows:

Granite: With a short railroad haul to Burlington, thence by barge direct to destination, would cause a lower freight rate which now prevents competition with granite from the coast of Maine, and the increase in this industry would be at least 50 per cent. For example, it costs 18 cents per 100 pounds to ship granite from Barre to Brooklyn, N. Y., by rail to Troy, and thence by barge down the Hudson River. The cost by this barge for 150 miles is only 3½ cents per 100 pounds. So that one dealer says: "If the water transportation can lower the freight rate one-half, the market will be unlimited for granite, and the refuse of the quarries could be made into paving blocks and crushed stone at a profit." The present annual business is from $6,000,000 to $10,000,000, and increasing even under present conditions against fair competition. It is stated that on most articles to Vermont freight is about $3.50 per ton, and that the proposed transportation rates would be one-fourth of that.

Stone and hardware: Burlington's water terminal would put this business on more than an even basis with other cities, and increase its territory.

Apples: Fifty thousand barrels shipped from Grand Isle County alone with only two or three thousand barrels now going by canal. Under the new conditions almost all would be shipped by barge canal. There has been a great increase in this industry the last two years, and cheaper freight rates will help enlarge this fruit business still more.

Coal: As this commodity is required for about all new industries and for the increase of present business, it is estimated the increase of coal used in northern Vermont will increase from 100 to 500 per cent.

Ice: With large barges and good facilities for handling this commodity at low rates, a large share of this industry now going to New York and the great cities from the Kennebec in Maine will be transferred to Lake Champlain. This is now prevented by the cheaper transportation by sea.

Cement: Will greatly increase this commodity; reduce its cost so that it can be more generally used.

Iron industry: Would double the territory for the manufacture of iron work of all kinds.

Hay, feed, fertilizer, and agricultural products, including talc and asbestos. Shipments would largely increase to the West and the South.

Manufacturing: Boats would offer cheaper rates to get return cargoes, so manufacturing ought to largely increase. There would be brought here coal, iron, lumber, and cotton from the South and West, and the outgoing shipments of the finished products would bring industrial plants to the vicinity of Burlington. Manufacturing enterprises under the new conditions will seek Burlington and make it a manufacturing center, so that it could compete with cities like Fall River and New Bedford. This would cause increased population and make Burlington a larger jobbing center. It is suggested that in order to get the best facilities for handling freight at the port of Burlington for the interior of the State there should be a State freight terminal located adjacent to the city, but separate from the city's water terminal. A barge canal will also bring a great increase in pleasure craft from the large cities to use the waters of Lake Champlain, and Burlington would be the natural port for refitting and supplies.

The replies to these important questions, while they can be in the main only answered in a general way, indicate a growing interest in the subject of the coming improved water transportation facilities for Burlington and northern Vermont, and that it will greatly increase and stimulate business in this section of New England. As one writer says: "The Narrows of Lake Champlain should be improved in the best possible manner, whatever the cost."

Respectfully submitted.

H. S. HOWARD, *Secretary*.

[Inclosure No. 2.]

THE NEW WILLARD,
Washington, D. C., September 24, 1912.

From: Secretary of Chamber of Commerce, Plattsburg, N. Y.
To: Capt. R. D. Black, Corps of Engineers, United States Army.
Subject: Commercial Statistics.

SIR: The Chamber of Commerce of Plattsburg, N. Y., herewith begs to submit a preliminary report outlining the vital need to this city and vicinity of the improvement of the Narrows of Lake Champlain by the Government.

First. That Adirondack Mountain chain, immediately adjacent to Plattsburg, contains what mining experts are agreed is the finest quality of iron ore found in this country, not excepting that of Lake Superior region. The ore is now used in making the finest quality of tool and other high-grade steel, notwithstanding the fact that it is more difficult and costly to mine. What is now mined is shipped by rail considerable distances to the mills.

With the constantly increasing cost of mining the Lake Superior ore due to the additional depth to which those mines have to be worked; with the rapidly increasing demand for fine steel of which the Adirondack ore is a prime requisite; and with the possibilities of all-water shipment via the Champlain Canal, the Hudson River, and the inland water route to the Atlantic seaboard and the mills themselves, the development of the Adirondack mines to the full in the early future is definitely assured. This is shown by the recent acquisition of valuable mining properties adjacent to Plattsburg by different large interests. These interests are making extensive preparations to mine the ore upon a large scale. Engineers have been engaged for some time past in making complete and exhaustive surveys and borings. With an all-water route from the mines to the mills, the item of transportation assumes a tremendous importance. The saving in water shipment as against rail in cost because of great weight will be enormous.

Plattsburg is the only natural outlet or port for the shipment of a vast amount of this ore, estimated by experts at 1,000,000 tons per annum with these mines developed upon a paying basis. Appropriation has been made by the State of New York for a suitable terminal at Plattsburg where this ore may be stored and loaded on barges. The improvement of the Champlain Narrows, however, is vitally essential to its shipment by all-water route.

Second. The Ausable Valley, the only natural outlet of which is Plattsburg, produces a granite that for monumental and building purposes rivals that of the famous Barre quarries in Vermont, according to experts who have examined it thoroughly. Some of these quarries which have but recently been discovered contain a grayish greenstone in great demand, found nowhere else in the United States.

The proper and full development of these quarries depends almost entirely upon a low rate of transportation, such as would be afforded by an all-water shipment, in order that this stone can compete with that from the Barre quarries in Vermont. New York and adjacent cities is the great market for this stone. It would be brought within a surprisingly short distance of the Plattsburg quarries with the opening of the Champlain division of the barge canal and the improvement of the Narrows by the Government. Here, as in the case of the iron ore, transportation, because of the excessive weight in proportion to bulk, is one of the greatest factors to deal with.

Third. The Saranac River, which empties into Lake Champlain at Plattsburg, is the second river in the State of New York from the standpoint of average flow for water-power purposes. Already the International Paper Co. and several other mills are using this power. There are still, however, thousands upon thousands of undeveloped horsepower upon the Saranac River which is not harnessed because of lack of cheap transportation to the markets and from the sources of supply of the raw products.

With the improvement of the Lake Champlain Narrows by the Government and the opening of the all-water route to the Atlantic seaboard at New York the one great obstacle to the development of the tremendous water power on the Saranac River will be overcome. Manufacturing establishments can then be induced to locate on this river and will increase the tonnage of this all-water route many thousands of tons per annum. Plattsburg as the port of the Saranac Valley and situated as it is at the mouth of the river by that name is the only logical and, in fact, natural shipping point for this trade.

Fourth. Thousands of cords of pulp wood, millions of feet of hardwood lumber from the woods and timberlands adjacent to Plattsburg, thousands of tons of coal, and, in fact, manufacturing products, food supplies, etc., of all kinds now shipped almost entirely by rail to and from Plattsburg would upon the opening of this all-water route to New York and the improvement of the Narrows be shipped in barges by water. This because of the vast economy of transportation charges and as the result of a careful analysis and investigation of the situation in Plattsburg.

The Chamber of Commerce of Plattsburg, N. Y., submits the above as a preliminary report. It has in preparation a more detailed and exhaustive report, which will be submitted in the near future upon its completion.

Respectfully submitted.

CHAMBER OF COMMERCE OF PLATTSBURG, N. Y.
J. ARTHUR RITCHIE, *Secretary*.

[Inclosure No. 3.]

STUDIES RELATIVE TO WIDTH AND CURVATURE, WITH PLATE MARKED "3A."

ANALYTICAL AND GRAPHICAL STUDY OF WIDTH AND CURVATURE IN CONNECTION CHANNEL DESIGN.

[Prepared in connection with report on survey of Narrows of Lake Champlain, N. Y. and Vt. ordered by river and harbor act of June 25, 1910.]

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New York City

I. The problem in hand is to indicate by analytical and graphical study the bottom width and radius of curvature of a channel requisite for safe navigation with the following assumptions as an hypothesis:

(1) Depth of channel, 12 feet.
(2) Maximum dimensions of cargo craft:
    (*a*) Length, 300 feet.
    (*b*) Beam, 42 feet.
    (*c*) Depth (taken as sum of draft and mean freeboard), 16 feet.
    (*d*) Draft loaded, 10 feet.
    (*e*) Draft light, 3 feet.
    (*f*) Vessel to be of full-molded cargo-carrying model.
(3) Vessels to operate under their own power (propeller); singly under tow of a tugboat, or in pairs, one towing the other.
(4) Dimensions of tugboat (adopted from existing tug *Protector*):
    (*a*) Length stem to rudder post, 100 feet.
    (*b*) Beam, 22 feet.
    (*c*) Draft, 8 feet.
    (*d*) Vertical projection of surface exposed to beam wind, 800 square feet.
    (*e*) Single screw.
(5) Velocity of current not considered.
(6) Mean velocity of wind, 9 miles per hour.
(7) Maximum velocity of wind, 15 miles per hour.
(8) Direction of wind, normal to center line of channel (on curves, at point of maximum curvature).
(9) Speed on course, 4 miles per hour.
(10) Dimensions of passenger steamer *Vermont:*
    (*a*) Length, 275 feet.
    (*b*) Beam over all, 70 feet.
    (*c*) Paddle wheel.
(11) Vessels to remain within bottom limits of channel.
(12) Economy in traction varies directly and manageability inversely as the length of towing hawser, when under tow.

II. The following conditions will be investigated:

(1) Straight reaches, no wind. (Fig. 1.)
(2) Straight reaches, 9-mile wind. (Fig. 2.)
(3) Straight reaches, 15-mile wind. (Fig. 3.)
(4) Curves, no wind. (Fig. 4.)
(5) Curves, 9-mile wind. (Figs. 5, and 7.)
(6) Curves, 15-mile wind. (Figs. 6 and 8.)

Since wind action upon a vessel is a maximum when her freeboard is greatest, the discussion under conditions 2, 3, 5, and 6 will be made only in connection with boats light.

III. Straight reaches, no wind. Figure 1 illustrates the space occupied by craft.

IV. Straight reach, 9-mile wind. (See fig. 2.) The case of a self-propelled cargo boat will be taken. (See fig. 2.)

Referring to assumption 2f, the vertical projection of the surface exposed to wind action is

$$300\times13=3{,}900 \text{ square feet.}$$

The following formula from Steel Mill Buildings, by M. S. Ketchem, page 12,

$$U-0.004V^2, \qquad \text{(Formula A)}$$

in which U=pressure in pounds per square foot exposed surface and V is the velocity of the wind in miles per hour, gives the normal wind pressure due to a nine (9) mile wind, as

0.324 pound per square foot or 1,264 pounds. (Deduction A)

The area of the submerged portion of a vertical, longitudinal section, through the keel is

$$3\times300=900 \text{ square feet.}$$

Assuming that the resistance offered by the water to lateral motion of the boat is less than that offered to the motion of a thin plate, 900 square feet in area, we then have from the following formula of J. H. Cotterill's Applied Mechanics, page 497—

$$P=k\,w\,s\,\frac{V^2}{2g} \text{ in which} \qquad \text{(Formula B)}$$

P=intensity of wind pressure (formula A, par. 4)=1,264 pounds.
K=constant=1.86.
W=weight of cubic foot of water=62.5 pounds.
S=area of lateral cross section of boat=900 square feet.
V=lateral velocity of boat in feet per second.

Substituting in the formula and solving for V:

V=0.88 feet per second=0.60 miles per hour.

Assuming that the effective wind pressure is not reduced by a change in direction of a few degrees from the course, an assumption which is incorrect but involves a negligible error in final result, and assuming that the rate of progress on the course is 4 miles per hour, we may, by plotting the rectangular components of motion AB and BC and their resultant AC, determine the angle of deviation of the axis of the boat from the course, as shown on the diagram. (Fig. 2.)

Plotting the position of a second boat moving in the opposite direction, we see that the channel space actually occupied is (2×83′)+(clearance).

Referring to the figure, a clearance of 10 feet between boats allows a clearance of 12 feet between boat and shore in a 200-foot channel.

IV (*a*). Straight reach, 15-mile wind. (See fig. 3.) Utilizing the same method as illustrated in figure 2, the angle of deviation of the vessel's axis from her course under a 15-mile wind will be shown.

Referring to assumption 2f, the vertical projection of the surface exposed to the wind action is:

$$300\times13=3{,}900 \text{ square feet.}$$

Formula A, Paragraph IV, in which in this case V=15 miles per hour, gives us a normal wind pressure of

0.9 pounds per square foot or 3,510 pounds.

Applying formula B, Paragraph IV:

$$P=K\,W\,S\frac{V^2}{2g}$$

The same conditions exist here as in Paragraph IV, except that

P=3,510 pounds.

Substituting in formula B, we find

$$V=1.5 \text{ feet per second,}$$

or

1 mile per hour±

and approximates the transverse velocity of the vessel through the water due to wind pressure.

Making the same assumptions as to discrepancies and using the same method as in Paragraph IV, figure 2, a similar diagram is plotted with the new conditions, figure 3.

Plotting the position of a second boat moving in the opposite direction, we see that the channel space actually occupied is

$$(2\times105')+(\text{clearance}).$$

V. Curves, no wind. Figure 4 illustrates the space occupied by two large self-propelled boats passing on a curve with a radius to the center line of 1,300 feet, based on the formula given on page 160 of the Report on the Intracoastal Waterway, 1912 (Doc. 391, 62d Cong., 2d sess.), viz:

$$D=\sqrt{R^2+L^2}-R,$$

Where D=increased width occupied.
R=radius of curve.
L=length of boat.

The increased width as deduced for a boat 300 feet long and a radius of 1,300 feet is 34 feet per boat, making a total width required of 68 feet for two boats plus clearance, or 88 feet.

This increase in width should be commenced at least one boat's length before the point of commencement of the actual curve, so as to make an easy transition of movement.

It will be seen that the channel space is an inverse function of radius of curvature.

V (*a*). Curves, 9-mile wind. (See fig. 5.) The case of a self-propelled cargo boat will be taken first.

In this case, at the point where the radius to her center of pressure is parallel to the wind, the vessel will have to stand into the wind in order to maintain her course, at the same angle as determined in the case of a boat on a straight reach. (Par. 4, fig. 2.) At other points on the curve the angle between the axis of the boats and tangents to the course moved are smaller.

Plotting the position of two boats passing each other under these conditions and adding the increase of width required by the formula just given (amounting, as before, to 34 feet per boat), the total width needed is 119 feet per boat plus clearance, or 258 feet.

V (*b*). Curve, 15-mile wind. (See fig. 6.) Similarly, two boats plotted under 15-mile wind conditions show that the channel space actually occupied is 149′ + clearance, or a total of 318 feet.

It should be noted that the foregoing takes no account of the expedient of temporary "straightening up" which pilots use when passing another boat under the influence of wind and in a narrow channel, and which often enables them to get by at comparatively close quarters.

VI. Straight reach, wind 9 miles. (Fig. 7.) The case of a boat being towed by a tug will next be considered.

For clarity, the boats will be assumed as stationary and the forces holding them in equilibrium as those due to the relative movement of wind and water and the tractive effort and rudder reaction.

The first step will be to deduce the towline force in intensity and direction. Other forces maintaining the towed vessel in equilibrium are transverse wind pressure, rudder reaction, and water resistance to hull in direction of its axis.

There is no relative transverse motion between the towed boat and water and, consequently, only balanced transverse water pressure on hull, which will be neglected.

Referring to formula A, deduction A, Paragraph IV, it has been shown that the normal pressure of a 9-mile wind on boat is,

0.324 pounds per square foot, or 1,264 pounds.

For convenience this force will be replaced by two equal components of half its intensity applied at the bow and stern (*c* and *d*).

We next deduce the force due to the resistance of the hull to passage of water parallel to axis at 4 miles per hour.

From formulæ from Trans. A. S. C. E., 1880, by E. Sweet.

$$R=\frac{0.10303\ SV^2}{p-0.597}$$

in which $$p=\frac{\text{area of channel cross section}}{\text{area of boat's cross section}}=\frac{m}{n}$$

$$S=\begin{matrix}[(\text{length of boat in feet})\times(\text{draft of boat in feet})\times(1.7)]+\\ [(\text{length of boat in feet})\times(\text{draft of boat in feet})\times(\text{block coeff.})]\end{matrix}$$

(See Par. II (*a*) and (*f*).)

V=velocity of boat in feet per second.

Let area (m) be assumed as 12×200, or 1,200 square feet (Note: Probably too small a value), and area N=3×42=126 square feet.

Substituting numerical value, we get

$$R=2{,}800\text{ pounds }\pm.$$

We now have values for the following forces:

Wind=1264 pounds.
Longitudinal resistance=2,800 pounds.

Referring to figure 7: A is the center of transverse wind and water pressures assumed so that AB=AC.

Force *h* is resolved into rectangular components *a* and *g*.
e and *d* represent the components of the wind force.
c and *f* represent components of rudder reaction.
b=water resistance.

We now have the following equations of equilibrium:

$$e+d=f+g$$
$$a=b+c$$
$$(g+e)\ AB=(f+d)\ AB.$$

Solving for unknown forces, we have,

$$g=632\text{ pounds.}$$
$$a=3{,}432\text{ pounds.}$$

Then, components of *h* being known, it is determined in intensity and direction, and the angle=10° 30′ ±.

Assuming that the axis of tug lies in a prolongation of the tow line, or nearly so, we may readily obtain the channel room occupied for varying lengths of tow line and dimensions of tug.

VI (*a*). Straight reach, wind 15 miles per hour. (See fig. 8.) Under similar conditions and by a similar deduction, the towline force, with a wind of 15 miles per hour, is determined in intensity and direction as 4,800 pounds and making an angle of 21° ± with the axis of the towed vessel.

VII. Straight reach, wind 9 miles per hour. (See fig. 7.) Having deduced the towline angle and tension, the angle which the axis of the tub makes with the hawser is next considered.

The length of the tug is relatively short, the angle which she will make with the towline is not great. An exact quantitative solution of the problem involved in determining this angle requires a consideration of a number of somewhat intricate factors depending on design of hull and house in relation to the resistance offered by them to water and wind.

The method of solution of the problem is indicated by the diagram. (Fig. 7a.)

Let AB represent the axis of the tug from stem to rudder post and let C be the position of the towing bitts, and D the center of transverse wind and water pressure, assumed so that AD=DB.

Let FG represent relative direction of wind.

Let FH indicate direction of relative motion of water, whose velocity is 4 miles per hour.

The forces holding the system in equilibrium are then as follows:

a=longitudinal component of water reaction.
b=transverse component of water reaction.
c=transverse component of wind pressure.
d=longitudinal component of wind pressure.

Substitute for b and c, c', and c'', each equal to $\frac{1}{2}(b+c)$ (algebraically).

e=intensity of towline pull.

Resolve e into longitudinal and transverse components f and g, respectively.

Let h=transverse component of rudder reaction.
i=longitudinal component of rudder reaction.
k=propelling force of tug.

The equations of equilibrium are then,

$$k=i+f+a+d$$
$$g=c'+c''+h$$
$$(g)\,\mathrm{CD}+(c'')\,\mathrm{DB}=(c'+h)\,\mathrm{AD}$$
$$(\mathrm{AC}\ \text{taken as}\ 10').$$

(e) is the only force whose intensity is given directly. a, b, c, d are susceptible of computation, but, as stated, their exact computation is intricate and not considered justifiable herein. When values are determined for these forces, the solution of the above equations of equilibrium will establish the intensity of all the other forces and the relation between f and g will determine the angle between the towline and the axis of the tug.

From a rough computation based upon successive approximations and formulæ for wind pressure, from Steel Mill Building, M. S. Ketchem, page 12; water pressure, from Applied Mechanics, by J. H. Cotterill, page 495, the following values were obtained:

a and d are neglected as not affecting values of f and g.
b=90 pounds.
c=260 pounds.

Solving the equations of equilibrium with these values, the angle between the towline and axis of boat becomes 10°.

As stated above, this angle will vary with model of boat.

It is obvious as before that the channel room is a direct function of the length of towline.

VIII. A similar method of treatment with similar assumptions as to wind and water resistances to the towboat with a wind of 15 miles per hour is illustrated by figure 8 and gives an angle of about 20° between axis of tug and towline.

IX. Curves, vessels in tow. By a method of graphical study similar to that applied in Paragraphs IV to Vb, the minimum channel for various radii of curvature and length of towline can be deduced readily.

X. Conclusion. Summarizing and generalizing from the foregoing deductions and making a minimum allowance for clearance necessary for safety, it is concluded:

That a minimum width on straight reaches of 200 feet increasing in inverse ratio, with the radius of curvature to 287 feet for minimum allowable radius of 1,300 feet is required for the movement of freight traffic, and that the width should be increased to allow safe handling of passenger traffic.

XI. In connection with the above studies, all formulæ from outside sources were searched out and applied by Mr. W. Y. Stamper, United States surveyman. Mr. Stamper's deductions were revised by Messrs. Watt and Kuehnle.

[Inclosure No. 4.]

ALBANY TOWING CO.,
Rensselaer, N. Y., October 18, 1912.

From: Mr. Ulster Davis, Albany Towing Co.
To: Capt. R. D. Black, Corps of Engineers.
Subject: Improvement Narrows, Lake Champlain.

DEAR SIR: As we are likely to become very much interested in the navigation of the Champlain Canal and its approaches at either end, and as this comes under your office to improve the channels into Whitehall Harbor, we would like to suggest the following improvements:

First, that the channel from Whitehall through the Narrows be made 200 feet wide, and that the numerous bends be eliminated as much as possible to do so.

That the place called the "Elbow" be approached by going around through the marsh, thereby avoiding the present dock front of Whitehall, and making a harbor for traffic that would very likely interfere with the navigation of the channel if it is improved along the present dock front to the Elbow.

As it is undecided as yet just what type of vessel will be constructed to navigate the canals and the channels leading to them, yet it is safe to assume that we can look forward to vessels of at least 150 by 34 by 10 feet, and it certainly will be out of reason to think of navigating a vessel of that size the same as the present canal boat is navigated, and that is to slide around bends and over mud banks.

A vessel of that dimension under a very slight headway would not want to approach an easy slope, or the result would be to slide on, and not come off.

We believe that a 200-foot channel should be the minimum.

Thanking you for the just consideration of this matter, we beg to remain,

Yours, respectfully,

Albany Towing Co.,
Ulster Davis, *Manager.*

Capt. R. D. Black, United States Army,
United States Engineer Office.

LETTER OF COL. W. M. BLACK, CORPS OF ENGINEERS.

War Department,
United States Engineer Office,
New York City, January 31, 1913.

From: District engineer officer, New York district No. 1.
To: The Board of Engineers for Rivers and Harbors.
Subject: Narrows of Lake Champlain.

1. In accordance with your request of the 27th instant, an approximate estimate of cost has been prepared for a channel through the Narrows of Lake Champlain, having a bottom width of 150 feet, with a widening at bends, a depth of 12 feet at low lake level, and maximum side slopes of 1 vertical to 5 horizontal. This estimate covers the same distance (about 13 miles) as that for the 200-foot channel submitted on page 40 of my report of November 25, 1912, the total cost of which was given as $737,000.

2. The totals are as follows:

Excavation, 3,650,000 cubic yards, at 13½ cents	$493,000
Purchase of land	30,000
Clearing and grubbing	1,000
Placing new fender booms	10,000
Engineering and contingencies	53,000
Total	587,000

This is a reduction of $150,000 as compared with the 200-foot project.

The unit price of 13½ cents is made on the same basis as with the 200-foot channel, viz., building and operating a dredge for the work and apportioning the cost on a cubic yard basis. If done by contract, the excavation would cost from 20 cents to 25 cents per yard.

3. In considering these estimates, attention is invited to the fact that the original project of 1886 directed the obtaining of a channel with a least width of 150 feet and a least depth of 12 feet over this same portion of the Narrows. (Annual Report, Chief of Engineers, 1912, p. 207.) This was deemed advisable in order to facilitate the movements of the small canal boats then and now in use, and to permit them to be taken in fleets to and from Whitehall, the northern terminus of the connecting Champlain Canal. An average width of about 150 feet exists at present, but between the 6-foot contours only. It should be noted also that the existing project does not contemplate the removal of certain bends in the channel, which have proved to be a marked hindrance and danger to navigation.

4. The report of the New York State Engineer for 1905 (Supplement, vol. 2, pp. 1031, 1058) gives the present bottom width of the old canal as 44 feet, the size of the locks as 110 feet by 18 feet, and the maximum capacity of the boats as 190 tons. The depth of the prism is a scant 6 feet. The dimensions of the new barge canal are as follows (from pamphlet report of J. A. Bensel, State engineer and surveyor, 1912):

"The dimensions of the present enlargement, or barge canal improvement, are the same for all four branches of the system. Briefly it may be stated that the law requires a channel at least 75 feet wide at the bottom and having 12 feet of water. In rivers and lakes the width is 200 feet, and 72 per cent of the length of the whole system is in river or lake channel. The locks are 328 feet long between gates, 45 feet wide, and have 12 feet of water over the sills."

The capacity of boats suitable for the 75-foot prism is given as 1,500 tons.

Of the 61 miles of this new canal between Waterford and Whitehall only a little more than one-third is of the 75-foot width, and more than one-half has a 200-foot width. A recommendation has been made by the State engineer recently to have the 75-foot portions widened to 110 feet at an additional cost of $2,000,000, so as to permit boats to be used of a capacity of 3,000 tons.

5. When investigating the size of channel desirable for a new project I believed at first that a bottom width of less than 200 feet would satisfy requirements, but before completing the studies I came to the conclusion that any smaller width would react undesirably on the expected commerce, as it would enhance the cost of towing over a portion which causes difficulties even with the small existing boats. The present available width of channel, as before stated, is about 150 feet between the 6-foot contours. I was also convinced that the annual saving to the people which would result from the completion of the project as recommended, based on the stated demands of commerce, would warrant fully the expenditure required.

6. Investigations made prior to 1903 by the engineers of the barge canal as to the sizes of channels desirable for the natural waterway sections led to the conclusion that wherever practicable a bottom width of 200 feet should be used in order to minimize the difficulties of passing curves and of towing in currents. The conclusions reached by me led to the same belief, although made independently.

7. It is believed, since a navigation conducted in tows finds the present width of about 150 feet none too great in passing through the Narrows (see inclosure No. 3 of my report of Nov. 25, 1912), and since the boats to be used on the new canal will have a capacity of 1,500 tons or more, as compared with less than 200 tons under present traffic, that any channel width less than 200 feet would tend to restrict commerce seriously by increasing the cost and difficulties of towing. The new boats will have a draft of about twice that of those now in use and will be much longer, and the difficulty of handling them will be proportionately increased.

8. Under existing commercial arrangements the tows for Lake Champlain navigation are made up and broken at Whitehall. To change this established custom new wharves and terminal facilities would have to be created at some other point. The port nearest the entrance to the Narrows available for such uses is Port Henry. This to-day is without sufficient wharf space and its harbor is unprotected against wind and wave action from any quarter excepting the west. The improvement of the Narrows, as recommended in the project of November 25, 1912, would permit a continuance of the existing methods.

9. It is estimated that in the formation and recommendation to Congress of a project for improvement two distinct questions are involved.

One is strictly what may be termed a business engineering problem. Given a certain volume of commerce and a certain waterway, what improvements can be made in the waterway which will best fit it for the commercial needs within a cost justified economically by the saving which will accrue by reason of the improvements?

The other is, given a certain number of betterments, all economically advantageous, which of all, or what part of each, can be carried out without passing the limit of the sum of money available for such betterments?

10. It is believed that these questions should be kept separate. An improper solution of the first will lead to economic waste in the attempt to solve the second.

In railroad practice to-day enormous sums are being expended in straightening curves, reducing grades, and providing additional trackage, in part to correct errors in orignial location and construction, and wholly to make economies in operation.

An inadequate waterway is as uneconomical to operate as is an inadequate railway. Money spent for inadequate facilities is to a certain extent money wasted.

Given a certain project for betterments known to be adequate, any money expended should be along the lines of that project.

11. It is known that so long as the United States adheres to the policy of making all public improvements from its income it will be impossible to carry on in the most economical way the many improvements of the waterways which have been pronounced economical and advantageous. Some must be neglected entirely. For others the annual appropriations must be restricted.

It is submitted, however, that under this condition the best results can be obtained by recommending in all cases projects of improvement known to be adequate and economically justifiable and then to leave to Congress the judgment of how much money can be expended on each annually, and to the War Department the question of how that money can be expended to produce the best results.

12. It is also submitted that under an adequate project the work can be done as required to meet the necessities of a growing commerce as they arise. If the adopted project be inadequate, when the necessity for further improvement does arise a delay of about two years is necessitated in the time required for Congress to order a new preliminary examination and survey and in the submission of and action on the subsequent reports. Money appropriated in the meantime may have to be expended on work which, under the new project, must be done practically a second time.

13. Under all of the considerations given above I would strongly recommend that the project given in my report of November 25, 1912, be adhered to.

W. M. Black,
Colonel, Corps of Engineers.

O

NARROWS OF LAKE CHAMPLAIN, N. Y. & VT. 1912

STUDIES

CHANNEL WIDTH AND CURVATURE

TO ACCOMPANY INCLOSURE 3

SCALES AS INDICATED

PREPARED IN U. S. ENGINEER OFFICE.
NORTHERN SECTION NEW YORK DISTRICT NO. 1
ALBANY, N. Y.
UNDER THE DIRECTION OF
COLONEL W. M. BLACK, CORPS OF ENGINEERS, U. S. ARMY

House Doc. No. 1387 ; 62d Cong., 3d Sess

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1389.

SAVANNAH RIVER AT NORTH AUGUSTA, S. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION OF SAVANNAH RIVER AT NORTH AUGUSTA, S. C., WITH A VIEW TO DETERMINING WHAT IMPROVEMENTS ARE NECESSARY IN THE INTEREST OF NAVIGATION.

February 12, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, February 11, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 10th instant, together with copy of a report from Col. Dan C. Kingman, Corps of Engineers, dated November 29, 1912, on preliminary examination of Savannah River at North Augusta, S. C., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 10, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Preliminary examination of Savannah River at North Augusta, S. C.

1. There is submitted herewith, for transmission to Congress, report dated November 29, 1912, by Col. Dan C. Kingman, Corps

of Engineers, on preliminary examination of Savannah River at North Augusta, S. C., with a view to determining what improvements are necessary in the interests of navigaton, called for by the river and harbor act approved July 25, 1912.

2. It appears from the investigation made by the district officer, who is also division engineer, that the improvement desired at this locality is the protection of North Augusta from floods by the construction of a levee, or a revetment, similar to that being built on the Augusta side of the river. The object of the latter is to prevent a rapid and serious erosion of the bank which was taking place at every freshet and discharging large quantities of bar-making material into the channel below. The district officer states that revetment of the north bank would serve no useful purpose, and the construction of a levee as suggested by local interests would add nothing to the ease or safety of navigation. He is therefore of opinion that the proposed improvement is not worthy of being undertaken by the General Government.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 14, 1913, concurring with the views of the district officer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Savannah River at North Augusta, S. C., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
January 14, 1913.

The Chief of Engineers, United States Army.

1. Investigation by the district officer, who is also division engineer, as to the improvement contemplated in the item of law calling for this investigation, indicated that it was the desire of those interested that the South Carolina side of the river at Augusta, for a distance of about 2½ miles, be protected from freshets. This reach is above that covered by the existing project for the improvement of Savannah River between Savannah and Augusta. The district officer states that no consideration of navigation points to work of any kind upon the South Carolina side; that the construction of a levee would add nothing to the ease or safety of navigation, and would simply protect about 500 acres from a very brief period of overflow.

2. The district officer is of opinion that no work in this locality is necessary, and that the proposed improvement is not worthy of being undertaken by the General Government.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

4. It is clear from the facts presented that this improvement is not required in the interests of navigation, and therefore the board reports, concurring with the views of the district officer, that it is not advisable for the General Government to undertake the improvement of Savannah River at North Augusta, S. C., with a view to determining what improvements are necessary in the interests of navigation.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SAVANNAH RIVER AT NORTH AUGUSTA, S. C.

War Department,
United States Engineer Office,
Savannah, Ga., November 29, 1912.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Savannah River at North Augusta, S. C.

1. The river and harbor act approved July 25, 1912, provides for a preliminary examination of Savannah River, at North Augusta, S. C., with a view to determining what improvements are necessary in the interests of navigation.

2. The wording of this item does not clearly show what portion of the Savannah River is to be included in the examination, and with a view to ascertaining, if possible, the intention of Congress in regard to it, letters were addressed to Hon. James F. Byrnes and to Hon. Thos. W. Hardwick, Members of Congress from the adjacent districts, and the reply received from Mr. Byrnes indicated that the intention of Congress was to make an investigation of the river, on the South Carolina side of the same, from a point opposite Sibleys Mills to the Southern Railway bridge, 2 miles below, and that the purpose of the investigation was to determine what was required to be done to protect the South Carolina side of the river from freshets. It was ascertained that Dr. W. E. Mealing, of North Augusta, was chairman of the committee having the question of the improvement in charge. Dr. Mealing was met and conferred with by a representative from this office, and it was learned that he was interested in the protection of North Augusta from floods in the Savannah River, and that he was specially anxious to have a levee built from the high bluff, near Sibleys Mills, along the top of the South Carolina

bank of the Savannah River to the Southern Railway bridge, about 2½ miles below, and thence along the present line of the trestle of the railroad back to the bluff.

3. A map[1] has been compiled by Junior Engineer Garvin, which shows the territory on both sides of the river in this vicinity and clearly indicates the area which it is desired to protect from overflow.

4. The Savannah River forms, in part, the boundary line between South Carolina and Georgia. The city of Augusta is in Georgia. On the opposite side of the river is North Augusta, an unincorporated town with a population of about 1,900. It is situated in the State of South Carolina, and is distant 202 miles, by river, from Savannah, and 226 miles, by river, from the sea. The slope of the river in front of the city of Augusta, and for a mile or two above the same, is easy and gradual, but above this point, which is on the line separating the Piedmont Plateau and the Coastal Plane, there is a heavy slope and in the first four miles there is an average fall of eight feet to the mile, and numerous rock shoals prevent navigation.

5. The improvement of the river between Savannah and Augusta has been carried on by the Government under a definite project since 1890, but up to this time no improvement of the channel of the river has been undertaken above the Fifth Street Bridge, which is near the lower limit of the city of Augusta. This is one of three bridges originally built without draw spans, which cross the river in this vicinity, the Fifth Street Bridge being the farthest downstream. The introduction of draw spans in two of these bridges and the proposed introduction in the third will open up the river for navigation as far as the natural conditions will permit. Some 60 years ago the city of Augusta built a low dam across the head of the rapids, several miles above the city, and made arrangements for taking off the water in a lateral canal and conveying it to the city, where it is utilized for power purposes. The canal is also capable of being navigated. Above the dam the river is navigable and has been slightly improved by the General Government.

6. Recently, under authority of Congress, the United States Government and the city of Augusta have jointly engaged in revetting the bank of the river on the Augusta side for about 8,000 feet, the object of this revetment being to prevent a very serious and rapid erosion of the bank which was taking place at every freshet and which was discharging large quantities of bar-making material into the channel below and at the same time threatened the ground upon which the city is standing. This revetment is substantial in character, and when completed will make possible the construction of permanent wharves and warehouses and other terminal facilities along the city front. It will also make it possible for the city of Augusta to protect itself from overflow by a levee or revetment built upon the crest of the natural bank.

7. This describes existing conditions. The site of this revetment, strong and massive in character, upon the south bank of the river, has apparently led those upon the North Augusta side to fear that the river would shift its point of attack from the south to the north and would gradually damage or destroy the land upon that side. I do not think that this fear is well founded. The direction and force

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[1] Not printed.

of the current will not be changed by anything that is being done on the Georgia side of the river. The South Carolina side will be in no more danger than it was before. If anything, the danger will be slightly diminished, because the smooth and even bank upon the south side of the river will facilitate its discharge and tend to diminish the height of the freshets. No consideration of navigation points to work of any kind upon the South Carolina side. Revetment of bank would serve no useful purpose and the construction of a levee would add nothing to the ease or safety of navigation. The construction of a levee would simply protect about 500 acres from a very brief overflow, which may or may not be of annual occurrence. Observations have shown that the period of time that the river is above 25 feet on the Augusta gauge is of very short duration, merely a day or two, and the general level of the ground upon the North Augusta side is some 2 feet higher than this.

8. I am of the opinion that no work in this locality is necessary and that the proposed improvement is not worthy to be undertaken by the General Government.

9. In compliance with law, it may be stated that there are no questions of terminal facilities, water power, or other related subjects bearing upon the examination in question.

10. The map[1] which I have before alluded to is transmitted herewith. There is also transmitted a letter[1] from the Hon. James F. Byrnes, M. C., in which he explains his understanding of the intentions of Congress in regard to the examination in question.

11. As this report is unfavorable, there is inclosed a copy of notice[1] sent this day to interested parties, together with a list[1] of the parties to whom such notice was sent.

DAN C. KINGMAN.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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[1] Not printed.

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1390.

GALVESTON HARBOR AND ADJACENT WATERWAYS, TEXAS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT UPON CERTAIN HARBORS AND CHANNELS IN TEXAS, AT OR NEAR GALVESTON, WITH A VIEW TO SECURING A DEPTH OF 35 FEET.

February 12, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 11, 1913.

The Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, of this date, together with copy of report from a special board of Engineers, on examination of Galveston Harbor, Tex., and adjacent waterways, made in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 11, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on Galveston Harbor, Tex., and adjacent waterways.

1. There is submitted herewith for transmission to Congress report dated January 11, 1913, by a special board of engineers, rendered pursuant to the following provision of the act approved July 25, 1912:

> The Secretary of War may appoint a board of three engineer officers whose duty it shall be to examine and report upon the following harbors and channels in Texas, at or near Galveston, to wit: Galveston Harbor and Channel, Texas City Harbor and Channel, Port Bolivar Harbor and Port Bolivar Channel leading thereto, all with a view to securing a depth of thirty-five feet. The said board shall also make an investigation as to the advisability of constructing a dike or dikes along the Houston ship channel and report whether or not such dike or dikes will operate in lieu of the dike recommended in the report for Greater Galveston to be built east of the Texas City Channel for the purpose of protecting the Texas City Channel and Galveston Channel.

2. Under the provisions of the act approved May 27, 1908, an examination and survey were made of Galveston Harbor and the several interior channels, as a result of which the following improvements were recommended, all contemplating a depth of 30 feet:

Jetty extension, south jetty, 3,200 feet from jetty beacon	$2,000,000
Galveston Channel, widening from 700 feet to 1,000 feet from Fifty-first to Fifty-seventh Streets	55,400
Texas City Channel:	
North dike	1,432,000
Channel 30 feet by 200 feet	410,000
Port Bolivar Channel, channel 30 feet by 200 feet, with turning basin 1,000 feet square	91,080
Total	3,988,480

Of the above, Congress has adopted the extension of the Galveston Channel to Fifty-seventh Street, the dredging of the Texas City Channel and of the Port Bolivar Channel and turning basin.

3. The improvements now recommended by the special board are briefly as follows:

Entrance channel.—That the entrance channel be deepened to 35 feet, provided such deepening can be secured and maintained by dredging alone, and that $200,000 per annum for three years be appropriated for the purpose of determining experimentally the feasibility of such deepening.

Depths of interior channels.—That no depth greater than 30 feet be attempted in the interior channels until the results of dredging on the bar have demonstrated that such depth can be secured and maintained by dredging, and that in any case the deepening of Texas City and Galveston Channels beyond 30 feet be not undertaken until a dike has been provided that will afford protection against shoaling to the extent now prevailing in these channels.

Houston Ship Channel.—That the protection of this channel by dikes be not undertaken, but that it be maintained by dredging, for which purpose two suitable dredges should be provided.

Texas City Channel.—That a dike be built along the northerly side of this channel and that the channel be widened to 300 feet, with a depth of 30 feet; also that the maintenance of the channel by dredging be continued meanwhile, at an estimated cost of $50,000 per annum. The protection of the northerly side of Pelican Island is recommended at such time after the construction of the dike as the necessity therefor may become apparent.

Galveston Channel.—That no change in the project dimensions of this channel be made at this time, but that maintenance of the channel be continued by dredging, at an annual cost of $75,000.

Bolivar Channel.—That no change in the project dimensions of this channel be made at this time, but that the maintenance of the channel be continued by dredging, at an estimated annual cost of $25,000.

Extension of sea wall.—That the sea wall be extended for the protection of the harbor from blockade by storms and to permit an extension eastward of the wharf facilities, said work, however, not to be undertaken until the city of Galveston and other local interests first donate certain lands to the Government, quiet all claims to the present San Jacinto Reservation, and provide for the construction of 3,300 feet of similar sea wall extension.

4. Estimates covering the work recommended by the special board are given as follows:

Three years' dredging of entrance channel	$600,000
Texas City Dike and Channel	1,400,000
Protection of north side of Pelican Island	315,000
Sea-wall extension	1,185,000
Total	3,500,000

Of the above, the last two items are not recommended for immediate construction, leaving $2,000,000 as the cost of work to be promptly undertaken.

5. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated February 6, 1913. The board concurs with the special board in believing that it is advisable for the United States to undertake the construction of the Texas City Dike and Channel at an estimated cost of $1,400,000, and the proposed extension of the Galveston sea wall, under the conditions proposed, at an estimated cost of $1,185,000; but it does not believe that the proposed increase of depth from 30 to 35 feet or the proposed protection of the north side of Pelican Island are necessary or advisable at the present time. Of the work recommended by the board, at a total cost of $2,585,000, the construction of the Texas City Dike and Channel should be undertaken first, the extension of the sea wall to be included in the authorized project and its construction to follow when the conditions recommended as precedent thereto have been complied with by the city of Galveston or other local interests.

6. After due consideration of the above-mentioned reports I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Galveston Harbor and interior channels is deemed advisable to the extent of constructing the Texas City Dike and Channel, and the proposed extension of the Galveston sea wall at an estimated cost of $2,585,000 for first construction, this estimate being based on the supposition that the construction work will, as now seems desirable

and advantageous be prosecuted under a first appropriation of $500,000 for the Texas City Dike and Channel, subject to the conditions specified by both boards, with contract authorization for the balance required for this work, with a view to completing it in three years, and an annual appropriation of $150,000 for the maintenance of existing channels at Port Bolivar, Texas City, and Galveston. With reference to the extension of the Galveston sea wall, it is recommended that appropriation be made for this work when the city of Galveston and other local interests shall have donated the required lands to the Government, shall have quieted all claims to the present San Jacinto Reservation, and shall have given assurance satisfactory to the Secretary of War that it will construct 3,300 feet of similar sea-wall extension.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
February 6, 1913.

The Chief of Engineers, United States Army:

1. This is a report by a special board upon the several channels in and adjacent to Galveston Harbor, Tex., called for by the act of July 25, 1912. A complete and comprehensive report, covering the needs of present and prospective commerce at Galveston and vicinity, was made under authority of the sundry civil act approved May 27, 1908, which provided for an examination and survey of Galveston Harbor as a whole, including the auxiliary channels connected therewith, for the purpose of establishing a broad, comprehensive, and systematic plan for the future extension, enlargement, and deepening of said harbor so as to meet the growing needs of commerce. After a complete investigation, including extensive surveys, a comprehensive plan was designed to meet present and reasonably prospective needs and permit of expansion for future necessities. Attention is invited to the full and complete report upon this subject printed in House Document No. 328, Sixty-first Congress, second session.

2. After carefully analyzing physical and commercial conditions and giving consideration to the subject in all its phases, this board concluded with the following recommendations, intended t meet the needs of present and reasonably prospective commerce:

Jetty extension, south jetty, 3,200 feet from jetty beacon	$2,000,000.00
Galveston Channel, widening from 700 feet to 1,000 feet from Fifty-first to Fifty-seventh Streets	55,400.00
Texas City Channel:	
North dike	1,432,000.00
Channel 30 feet by 200 feet	410,000.00
Port Bolivar Channel, channel 30 feet by 200 feet, with turning basin 1,000 feet square	91,080.00
Total	3,988,480.00

3. These recommendations were based upon channels 30 feet in depth, investigation by the board leading to the conclusion that this

depth was all that was justified by the present commerce and any in prospect for a long time to come. It was then found that the difference in cost between a complete improvement to a depth of 30 feet and 35 feet was $10,386,000. A study of navigation conditions lead the board to the conclusion that the commerce which would be benefited by this additional depth of 5 feet would be so small when compared with the total commerce being successfully carried on a low-water depth of 30 feet that the United States would not be justified in making the additional expenditure. Of the above items recommended, Congress has adopted the extension of Galveston Channel to Fifty-seventh Street, the dredging of the Texas City Channel, and of the Port Bolivar Channel and turning basin.

4. The special board states that since the report on the comprehensive plan was submitted, the bar channel has shown a tendency to hold a depth of 30 feet, and has held that depth for nearly two years without dredging. The present line of deepest water crosses the end of the south jetty, and under this condition any extension of the jetty would be expensive, as well as inconvenient to commerce, which follows the present channel. The special board therefore is of opinion that it is not advisable to extend the jetty at this time.

5. Before undertaking any extension of the jetties looking toward securing 35 feet upon the outer bar, it deems it wise to determine definitely whether or not a channel of the greater depth desired can be secured and maintained by dredging alone. It believes that a depth of 35 feet through the entrance is desirable if it can be secured at reasonable cost. It believes there is a fair probability that such a channel may be secured and maintained by dredging alone, and it recommends that the deepening of the entrance channel to 35 feet by dredging be authorized, and for this purpose it recommends an expenditure of $600,000, to cover a period of three years' operation.

6. With reference to securing additional depth in the interior channels, the special board believes that the advisability of this improvement should depend upon the developments on the bar under the recommendations just made, and it therefore is of opinion that action looking toward an increase in depth to more than 30 feet in the interior channels should be postponed accordingly. No changes in the project dimensions of the Galveston City or Bolivar Channels are recommended at the present time, but for maintenance the sums of $75,000 and $25,000 annually, respectively, are recommended.

7. With reference to the Houston Ship Channel the special board, after careful investigation, concludes that there is no way in which a dike or dikes for the Houston Channel could operate in lieu of the dike previously recommended to be built north of the Texas City Channel for the protection of the latter, and that on account of the great cost of a dike or dikes it will be less expensive to rely on dredging for the maintenance of this channel. Two dredges are considered necessary.

8. With reference to the Texas City Channel the special board states that a suitable dike along the north side of this channel is necessary for its maintenance, as well as to lessen the cost of the maintenance of the Galveston Channel, but believes that it can be built at less cost than previously estimated by using a creosoted timber dike, covered with excavated clay and other hard material, so as to render it of reasonable permanence. Complaints have been made that the

peresent channel width of 200 feet is insufficient, and to remedy this, but mainly for the purpose of securing suitable material for the construction of the dike, it is recommended that the channel be widened to 300 feet. The cost of the dike is estimated at $480,000, of the dredging $800,000, and of riprap needed to protect the eastern end of the dike and to afford protection in certain exposed places $120,000, or a total of $1,400,000. The board states that a gap of 100 feet in width should be left between the western end of this dike and the Texas City Harbor lines to permit the passage of small boats, and that "any appropriation made for the construction of the dike and the widening of the channel should be contingent upon the setting aside by the town of Texas City of a suitable right of way for a railroad or railroads through the said city, within its limits, said right of way to be available to any railroad or railroads that may at any time be authorized by the United States to occupy or operate over said dike." Estimated annual cost of maintenance dredging is $50,000.

9. Anticipating changes in the tidal currents, due to the construction of the Texas City dike, the special board believes that some protection along the north side of Pelican Island and Spit may be necessary, and for this purpose an estimate of $315,000 is made. The special board recommends, however, that the placing of this protection await developments and a determination of the necessity therefor.

10. The special board invites attention to the advisability of protecting the narrow neck between the city of Galveston and Fort San Jacinto. It believes that in time of great storm this neck may be breached, resulting in serious damage to the Galveston Channel. It believes that the sea wall should be extended, and that this work should be done through the cooperation of the United States and the city of Galveston. The total extension of sea wall proposed is 10,300 feet, of which the special board believes the United States should provide 7,000 feet and the city 3,300 feet. The estimate for the work proposed to be done by the United States is $1,185,000. This work is recommended by the special board "contingent on a satisfactory cession to the United States, free of cost, of all land east and north of a line originating at the intersection of the center line of the south jetty with the present southern boundary of the Fort San Jacinto Reservation and extending thence approximately S. 16° E. to the Gulf of Mexico (this line being made parallel to the numbered streets of the city of Galveston)," and "upon the quieting of any claims that may be outstanding to the present Fort San Jacinto Reservation," as well as "upon local interests providing for the building of that portion of the extension which lies between the angle of the present sea wall at Sixth Street and Broadway and the above new boundary proposed for the Government reservation."

11. The above appropriations aggregate as follows:

Three years' dredging of entrance channel	$600,000
Texas City Dike and Channel	1,400,000
Protection of north side of Pelican Island	315,000
Sea wall extension	1,185,000
Total	3,500,000

Also $150,000 annually for maintenance of Galveston City, Texas City, and Bolivar Channels.

Eliminating the estimate for the protection of north side of Pelican Island and that for the sea wall extension, which is not necessary until certain conditions are fulfilled, leaves $2,000,000 necessary for the work to be undertaken at present.

12. The Board of Engineers for Rivers and Harbors has again given careful consideration to the question of the necessity and advisability of increasing the project depth of Galveston Harbor entrance and interior channels. It finds little change in either physical or commercial conditions since the date of its last report on this subject. The entrance channel is perhaps a little deeper and more stable. The large coastwise commerce at this port is not affected by the present consideration, as the existing depth is ample for such commerce. The foreign trade is the only one interested. The principal article of commerce in this trade is cotton, and as this is a light commodity very large loads can be carried on the present depth. There has been little grain exported in recent years, certainly not enough to constitute an important factor in deciding upon an improvement that may ultimately lead to an expenditure of many millions of dollars. The shipment of iron ore, of which mention has been made, has not yet developed. The amount of commerce that would actually use a depth of over 30 feet is believed to be very small when compared with that which is and could be satisfactorily handled on 30 feet or less, and is not regarded as sufficient to warrant the great additional cost necessary to obtain 35 feet. The board reports, therefore, that in its opinion it is not advisable for the United States to undertake the improvement of Galveston Harbor and interior channels with a view to securing a depth of 35 feet.

13. The board recognizes, however, the necessity of some additional work in the interests of economy of maintenance and safety to the work already undertaken. Further study confirms the board in the opinion formerly expressed as to the need of a dike on the north side of Texas City Channel for the protection of that channel, as well as the Galveston City Channel, and the plan for a different form of dike, including a wider channel, now recommended by the special board, appears to be desirable. It does not consider it necessary to now adopt a project for the protection of Pelican Island Spit. The project proposed for protecting the neck of land between the city of Galveston and Fort Jacinto contemplates cooperation with the city of Galveston by which the city is to do a part of the work and donate certain valuable lands to the United States. It appears to the board that this is an equitable arrangement which will fairly reimburse the United States for the expenditures recommended in the interests of commerce and navigation.

14. In view of the foregoing, the board reports that in its opinion it is advisable in the interests of general commerce and navigation for the United States to undertake the following improvement at Galveston Harbor in addition to that now authorized:

Texas City Dike and Channel	$1,400,000
Sea wall extension	1,185,000
Total	2,585,000

in accordance with the plan proposed by the special board and subject to the conditions recommended by it. None of the $1,185,000 for the extension of the sea wall need be appropriated until the conditions described have been fulfilled, but this item is included in the project recommended for approval in order that the city of Galveston may proceed with its part of the work. The only work therefore which will have to be provided for in the initial appropriation is the construction of the Texas City Dike and the widening of that channel, which involves an expenditure of $1,400,000. It is recommended that an initial appropriation of $500,000 be made for this work, with authorization for the balance by contract, with a view to completing the work in three years. For the maintenance of the existing channels at Port Bolivar, Texas City, and Galveston, there should be an annual appropriation of $150,000.

15. In compliance with law, the board reports that, except as contemplated by the above recommendations, there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Senior Member Present.

REPORT ON GALVESTON HARBOR AND ADJACENT WATERWAYS, TEX.

UNITED STATES ENGINEER OFFICE,
Galveston, Tex., January 11, 1913.

The CHIEF OF ENGINEERS:

1. The board of officers appointed in accordance with the following paragraph of the river and harbor act, approved July 25, 1912, to consider and report upon various questions connected with Galveston Harbor, Tex., has to submit the following report:

> The Secretary of War may appoint a board of three engineer officers whose duty it shall be to examine and report upon the following harbors and channels in Texas, at or near Galveston, to wit: Galveston Harbor and Channel, Texas City Harbor and Channel, Port Bolivar Harbor, and Port Bolivar Channel leading thereto, all with a view to securing a depth of thirty-five feet. The said board shall also make an investigation as to the advisability of constructing a dike or dikes along the Houston Ship Channel and report whether or not such dike or dikes will operate in lieu of the dike recommended in the report for Greater Galveston to be built east of the Texas City Channel for the purpose of protecting the Texas City Channel and Galveston Channel.

2. The board met at Houston, Tex., January 6, 1913, and during the course of that week inspected the various portions of the harbor, holding meetings also at the United States Engineer office, Galveston, Tex. A public hearing in regard to the matter was held at Galveston, Tex., January 7, and a stenographic copy [1] of the statements made, together with papers [1] submitted in writing, is appended hereto. This hearing was largely attended by representatives of the various steamship lines and railroads interested in the commerce of the port.

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[1] Not printed.

HISTORICAL.

3. Galveston Harbor in its larger sense includes the channel and terminals at Galveston City, the channel leading to and at Texas City, and that leading to and at Port Bolivar, together with the entrance to the harbor from the Gulf of Mexico. It has also at times been extended to include the Houston Ship Channel and the channel in Buffalo Bayou to the city of Houston, to which point a 25-foot channel is now in process of construction.

4. A full report upon the physical conditions of the locality, together with a history of the harbor improvement, was made in the report submitted under date of December 30, 1908, by Maj. (then Capt.) J. C. Oakes, Corps of Engineers, and published as House Document No. 328, Sixty-first Congress, second session. His report was submitted in accordance with the following provision of the sundry civil act approved May 27, 1908:

> That the Secretary of War be, and he is hereby, authorized and directed to cause to be made an examination and survey of Galveston Harbor as a whole, including Galveston Harbor, Galveston Channel, Texas City Channel, and Port Bolivar Channel, in the State of Texas, for the purpose of establishing a broad, comprehensive, and systematic plan for the future extension, enlargement, and deepening of said harbor, so as to meet the growing needs of commerce, and to estimate the probable cost thereof, the cost of said examination and survey to be paid out of the foregoing appropriation.

5. The report rendered by Maj. Oakes in accordance with this provision gives the commercial statistics to its date of submission and includes a comprehensive scheme for the general future improvement of the harbor. The recommendations contained therein are summarized as follows:

> First. That funds be provided for the immediate completion of the adopted project for Galveston Channel, with an enlargement of the project to include a 1,400-foot channel along the developed water front and extending to Fifty-seventh Street; that Texas City Channel be widened to 200 feet on bottom and 30 feet deep; that Port Bolivar Channel be widened to 200 feet on bottom, with a turning basin 1,000 feet square, channel and turning basin to be excavated 30 feet deep; that when appropriations are made for Galveston Channel and Texas City Channel provision should be made for the construction of a dike extending from Texas City on the mainland on the north side of the channel to station 28, and another dike extending from station 22 on the south side of the channel to Galveston channel, and thence in a southerly direction to join the present pile and brush dike on Pelican spit.

Estimate of cost.

Required to complete present Galveston Channel project	$1,074,724.52	
Enlargement of the present project additional 700 feet between Fifty-first and Fifty-sixth Streets	129,310.00	
Total required for channel 1,400 feet wide and 30 feet deep to Fifty-sixth Street		$1,204,034.52
Texas City Channel, 200 feet wide on bottom and 30 feet deep	410,000.00	
Port Bolivar Channel, 200 feet wide and 30 feet deep, with turning basin 1,000 feet square, same depth	91,080.00	
Dikes	2,464,480.00	
Total		2,965,560.00
Grand total		4,169,594.52

> Second. That funds be provided for the extension of the jetties to the 35-foot contour for the purpose of obtaining a 35-foot channel over the ocean bar.

Estimate of cost.

North jetty extension, 10,300 linear feet	$5,963,205
South jetty extension, 9,250 linear feet	4,646,124
Total	10,609,329

Third. That Galveston, Texas City, and Port Bolivar Channels be deepened to keep pace with the increased depth of water across the ocean bar and through the jetties.

Estimate of cost.

Deepening Galveston Channel to 35 feet to Fifty-seventh Street	$441,089
Deepening Texas City Channel to 35 feet	158,000
Deepening Port Bolivar Channel and turning basin to 35 feet	33,500
Total	632,589

Fourth. That Galveston Channel be extended westward to the bridge as rapidly as the water front is developed, with 1,400 feet width and 35 feet depth. Estimate of cost, $2,067,400.

Fifth. That Texas City Channel be increased in width to 500 feet with a depth of 35 feet. Estimate of cost, $1,640,900.

Sixth. That Port Bolivar Channel be increased in width to 500 feet with a depth of 35 feet. Estimate of cost, $98,300.

Seventh. That the channel be excavated extending from Galveston Channel to connect with Texas City Channel 1,400 feet wide and 35 feet deep, extension to keep pace with the development of the wharf frontage. Estimate of cost, $3,847,210.

Eighth. That the 1,400-foot channel be extended across to the mainland and thence parallel to the mainland between the bridge and Texas City. Estimate of cost, $5,523,620.

Ninth. That Port Bolivar Channel be extended in either direction along the harbor line as the wharf front develops to a width of 1,000 feet and depth of 35 feet. Estimate of cost, $97.20 per linear foot.

6. After full consideration of Maj. Oakes's report, the Board of Engineers for Rivers and Harbors recommended as follows:

In conclusion, the board recommends that the present projects be extended so as to include the following features:

Jetty extension, south jetty, 3,200 feet from jetty beacon	$2,000,000
Galveston Channel, widening from 700 feet to 1,000 feet from Fifty-first to Fifty-seventh Streets	55,400
Texas City Channel:	
North dike	1,432,000
Channel 30 feet by 200 feet	410,000
Port Bolivar Channel, channel 30 feet by 200 feet, with turning basin 1,000 feet square	91,080
Total	3,988,480

In addition to the above, $1,074,724 will be required for the completion of Galveston Channel under the existing project. The board recognizes the possibility of further expenditures becoming necessary in the future for developments along the lines of the general plan, but believes that their necessity is remote; that estimates now submitted may not be applicable when such necessity arises, and that local developments in the meantime may require a change in the details of the general plan now outlined. For these reasons the board is of opinion that further work than that provided for in this paragraph should not be decided upon at this time.

COMMERCE OF THE HARBOR.

7. The commerce of the port has continued to grow since the date of Maj. Oakes's report, and vessels entering the harbor show a tendency to increase both in numbers and also in actual size as far as the capacity of the harbor will permit. Some difficulty was

encountered by the board in obtaining information concerning the coastwise traffic, owing to the fact that vessels engaged in this commerce are no longer required to enter and clear at the customhouse.

8. The collector of customs for the port of Galveston reports the tonnage and value of exports and imports of the harbor for the fiscal years 1901–1912 and the first half of 1913 as follows, the figures being those for Galveston City, Texas City, and Bolivar Point:

Year.	Exports.		Imports.	
	Tonnage.	Value.	Tonnage.	Value.
1901	645,856	$101,857,300	39,876	$953,801
1902	601,750	96,722,066	47,345	969,206
1903	675,425	104,121,087	86,115	1,511,119
1904	969,566	145,316,457	90,382	1,847,646
1905	805,555	126,182,043	196,714	4,992,361
1906	1,052,678	166,317,652	263,145	5,818,876
1907	1,558,576	237,308,494	298,167	7,029,186
1908	1,015,349	161,352,201	284,681	5,693,609
1909	1,125,856	189,464,335	134,414	3,355,358
1910	1,075,637	173,178,992	124,416	2,488,006
1911	1,375,592	220,504,917	176,547	3,530,945
1912	1,337,115	218,140,783	215,165	4,301,011
	[1] 1,103,285	191,545,977	[2] 232,155	5,907,085

[1] July 1–Dec. 31, 1912.

[2] Calendar year 1912.

9. The number of revenue cars handled over the Galveston Wharf Co.'s property during the same period was as follows:

Year ending Nov. 30:	Cars.
1901	94,737
1902	83,544
1903	92,200
1904	87,606
1905	93,433
1906	104,110
1907	111,558
1908	109,164
1909	102,275
1910	86,844
1911	110,350
1912	130,314

10. Mr. J. H. Hill, manager of the Galveston, Houston & Henderson Railroad, furnished the board with a statement showing the number of loaded cars handled northbound by that company for itself and other roads which may be taken as giving a fair indication of the increase of imports and the tendency of the harbor to include general commodities among its articles of commerce.

Loaded cars handled northbound over rails of Galveston, Houston & Henderson Railroad.

Year.	Galveston, Houston & Henderson.	International & Great Northern.	Missouri, Kansas & Texas.	Total.
1896	3,612	5,211	3,599	12,422
1897	3,664	5,819	6,082	15,565
1898	3,459	4,858	4,933	13,250
1899	3,724	6,568	7,423	17,715
1900	2,581	5,080	5,524	13,185
1901	2,705	6,636	5,360	14,701
1902	2,588	9,564	6,320	18,472
1903	2,766	8,547	5,133	16,446
1904	2,808	10,126	5,625	18,559
1905	2,938	9,745	6,445	19,128
1906	3,451	12,132	6,280	21,863
1907	4,544	13,824	7,259	25,627
1908	4,065	10,889	7,361	22,315
1909	5,143	13,764	7,726	26,633
1910	6,994	13,389	7,505	27,888
1911	8,969	13,965	9,314	32,248

Per cent of increase 1911 over 1896, 159.6.

ENTRANCE CHANNEL.

11. Maj. Oakes's recommendation for the extension of the jetties to the 35-foot contour for the purpose of obtaining a 35-foot channel of entrance was modified by the Board of Engineers for Rivers and Harbors to an extension of the south jetty alone for a distance of 3,200 feet, at an estimated cost of $2,000,000. Since the report was submitted and the recommendation made, the bar channel has shown a tendency to hold a depth of 30 feet with only occasional dredging, and the harbor has enjoyed for nearly two years an entrance depth of 30 feet without dredging. The deepest water is at present across the end of the south jetty, the entrance channel being deflected in this direction as it passes into the open Gulf. The extension of the south jetty under this condition would therefore be both expensive on account of deep water which would have to be crossed and inconvenient to the commerce of the port, as it would involve progressive encroachment upon the existing channel and probably require the adoption of some temporary or makeshift channel across the bar. The latest surveys indicate a tendency toward the development of a channel midway between the jetties straight across the bar to sea, which now has, without artificial aid other than the jetties, a depth of practically 28 feet at mean low tide. Under the combination of these conditions the board believes that it is hardly justifiable at the present time to incur the expense for extending the jetty, as such work may prove to be unnecessary and might impose upon commerce an inconvenience which may possibly be avoided.

12. Without entering into a discussion in detail of all the questions involved in the results to be secured by the extension of the jetties, the board feels safe in asserting that based on the record of this entrance, as well as that of other similar jetty entrances, dredging will be required for securing and continuously maintaining a depth of either 30 or 35 feet. A large dredge has been provided for the entrance to Galveston Harbor and has had considerable work to do.

13. Before undertaking, therefore, the continuation of this improvement with a view to securing 35 feet upon the outer bar by the extension of the jetties at very considerable cost, it seems wise to determine definitely whether or not a channel of the greater depth desired can be secured and maintained by dredging alone. This board, therefore, concurs in that part of the recommendation of the Board of Engineers for Rivers and Harbors in its report above referred to which advises that the jetties be not extended as recommended by Maj. Oakes, and is further of the opinion that the extension of 3,200 feet recommended by the Board of Engineers for Rivers and Harbors should not be undertaken until it has been proved that the desired greater depth can not be secured and maintained by dredging alone. It may later be found desirable to extend the south jetty as recommended by the Rivers and Harbors Board, but that extension should not be made until its necessity for the maintenance of the deeper channel is more certain than is the case at this time or until conditions have so changed that such an extension can be made at less cost and with less inconvenience to commerce than would be the case under existing conditions.

14. In this connection it should be stated that the board is not unmindful of the fact that even if a 35-foot bar channel should be secured by dredging alone, and if it should be found practicable to maintain such a channel under normal conditions, there will always remain a possibility of sudden and material shoaling as a result of exceptional storms. It is believed, however, that, under the conditions stated, such shoaling will have only a temporary effect upon the commerce of the harbor pending its correction by a resumption of dredging operations.

15. The board is of the opinion that a depth of 35 feet through the entrance channel is desirable in the interest of the commerce of this port, if it can be secured at a reasonable cost. It is further of the opinion that there is a fair probability that such a channel may be secured and maintained by dredging alone and believes that an effort to that end should be made before resorting to the more expensive method of jetty extension. It is therefore recommended that the deepening of the entrance channel to 35 feet by dredging be authorized. A period of two or three years would be necessary to determine whether such project can be successfully accomplished.

16. There now belongs to this improvement a large modern sea-going dredge used mainly upon the entrance channel and a smaller dredge of older type employed almost exclusively upon adjacent harbors. The approval of the project here recommended should include the authority necessary for the construction of a second large dredge in case the plant now available should prove insufficient for the purpose, provided, however, that the proposed dredging operations show a reasonable probability of successful results with increased dredging facilities. The cost of operating the large seagoing dredge now owned by the improvement is estimated at $150,000 and the smaller dredge at $75,000 per annum. The economies possible through a successful attempt to deepen the channel by dredging alone in comparison to the cost of jetty extension, involving as the latter does the undoubted necessity for the maintenance of some dredging plant, are evident and sufficient to justify the trial of the former method.

17. To cover the cost of three years' operation of one and occasionally both of these dredges on the entrance channel, the board submits an estimate of $600,000, which should be made in three equal annual installments for the purpose of demonstrating what can be done in the way of increasing the depth of this entrance channel without extending the jetties.

DEPTHS OF INTERIOR CHANNELS.

18. The request is made by all interests concerned that the interior channels as well as the channel of entrance be given a depth of 35 feet. Such a depth was recommended by Maj. Oakes in his report, but was not recommended by the Board of Engineers for Rivers and Harbors for the following reasons:

> The export commerce of Galveston is important, being second in value in the United States. The large value of this commerce, however, does not furnish a criterion by which to judge the navigation facilities necessary at this port. These necessities are determined by the tonnage and character of the commerce. While the exports of the port of Galveston to foreign countries during 1907 were valued at $236,277,727, the greater part of this commerce was cotton, of which 3,500,000 bales, valued at $199,076,379, were shipped. The weight of this cotton was approximately only 900,000 tons. At New Orleans a commerce of greater tonnage than that of Galveston is handled through South Pass on a channel having a depth of 27 to 28 feet, and while a project now exists for a 35-foot channel through Southwest Pass, this depth has not been secured, and it is not known to what extent the channel will be used by vessels having a draft exceeding 30 feet, if that depth is provided.
>
> In the opinion of the board the extent and character of the commerce of Galveston are not such as to render the use of vessels of exceptional draft an economical necessity. After careful consideration, therefore, the board is of the opinion that the general scheme of development should be based on channel depths of 30 feet.

19. Since this statement was made New Orleans has secured a channel of practically 35 feet and the commerce of Galveston has shown a tendency to include articles of a more general character than prevailed at that time. At ports where the bar at the sea entrance is exposed to waves of large size it is necessary to provide an increased depth to avoid the vessels striking when in the trough of the sea, or as it is technically known, provide for the "send" of the ship in a seaway. This requirement under ordinary conditions demands a greater depth on the bar than in the interior channels, especially in the case of a port like Galveston, where the range of the tide is small. At Galveston, however, local conditions operate to make it advisable to provide as great a depth in the interior channels as upon the bar. The largest movement of freight through the port occurs during winter months when strong north winds termed "northers" are liable to prevail sometimes for days at a time and to lower the depth of water in Galveston Bay and the harbor channels sometimes to 3½ feet below mean low Gulf level. This condition creates a need for a greater depth in the interior channels than would otherwise be the case, and this increased depth corresponds roughly with that which would ordinarily be allowed upon the entrance bar.

20. Experience to the present time has however shown that by reason of the movement of silt and sand by the waves and currents prevalent in Galveston Bay, the maintenance of interior channel depths of 30 feet requires continual dredging and the removal of large quantities of material. The satisfactory maintenance of deeper channels is problematical unless means are taken to protect them

against large and constant shoaling and greater depths in the harbor will have relatively small value until the bar channel shall have been deepened to 35 feet. It seems wise to postpone action looking to a depth of 35 feet for any of the interior channels until it be demonstrated that a depth of 35 feet can be secured and maintained in the entrance channel at a cost commensurate with the benefits to result therefrom and until measures have been taken to provide protection for the important interior channels against excessive shoaling. The board therefore recommends that action looking toward an increase in depth to more than 30 feet in any of the interior channels be postponed accordingly.

HOUSTON SHIP CHANNEL.

21. The Houston Ship Channel, with a length of 70,600 feet from Morgan Canal to Red Fish Bar and of 60,100 feet thence to deep water in Bolivar Roads, is now under contract with the view of making it 25 feet deep and 150 feet wide at the bottom. Throughout its full length of 130,700 feet it is exposed to the action of currents and waves in upper and lower Galveston Bays and is subject to rapid deterioration by shoaling, especially since the bottom of these bays is in great part covered with fine silt or mud, which has been discharged into it for centuries by the various tributary streams, especially by Trinity River. These conditions render this channel easy of excavation, and work on it has usually been let at exceptionally low contract prices, the material for the most part being easily handled, but the same conditions are also the cause of rapid channel deterioration from wave and current action.

22. The construction of a dike on one side or of dikes on both sides of the channel would afford protection against these conditions and correspondingly reduce the shoaling and the dredging necessary for maintenance. Some dredging would, however, be necessary at intervals more or less frequent, since shoaling in the Houston Ship Channel will occur from time to time above Morgan Canal as a result of washing of banks and deposits from tributaries. Deposits may be expected also in the bay section from such causes and from wave wash from passing vessels. A dredge must be provided, therefore, if the channel is to be maintained with such constancy as is needed for the purposes of commerce, so that the diking of this channel will not obviate the necessity of having at least one dredge available.

23. The cost of diking this channel in any permanent or semipermanent manner is very large, owing to its great length. Borings recently taken along this channel show that soft mud is found in many places to depths as great as 40, 50, and even 60 feet. To build dikes of rock would involve prohibitive expenditures, especially since, for long stretches, the bottom is so soft that rock deposited upon it will settle to considerable depths. To build a dike of rock along one side and put in it enough material to allow for the settlement that will occur will involve a cost from Morgan Canal to Bolivar Roads of at least $10,000,000, while dikes upon both sides will cost double that amount. The expenditure of such sums can not be recommended.

24. A cheaper dike than one of rock can be constructed, however, of creosoted lumber, which should be able to resist decay and teredo

and have an efficient life of probably 15 to 20 years. If meanwhile such a dike could be covered with the spoil excavated from the channel so as to form a permanent beach on the side from which wave and current action will come there would be a great increase of permanency. Unfortunately, for long distances in this channel the material to be excavated is composed solely of fine silt or mud that will not lend itself to the building of such a bank. A creosoted dike would cost in the neighborhood of $16 per linear foot for the timber work alone. For the length of 130,700 feet this would mean $2,091,200, and to double that length (by putting a dike on each side) would cost $4,182,400. This also seems a very large amount, especially as one dredge would have to be maintained in any event.

25. To build the dike of untreated timber would be unwise in view of the inability to keep it sufficiently protected by a covering of excavated material and without such protection it would be certain of early destruction by the teredo.

26. In view of these conditions, it seems to be more economical to rely on dredging for the maintenance of this channel than to attempt its protection by dikes. One dredge will have to be provided and kept available as explained above. To be certain of having one dredge serviceable at all times it is prudent to provide two dredges so that in case of breakdowns or withdrawal of one of the dredges for repairs, etc., the other can always be in working condition. With two dredges there is, therefore, more certainty that this channel, barring damages caused by occasional hurricanes, can be maintained. This accords with the view of the board that originally recommended the construction of this channel. (H. Doc. No. 99, 55th Cong., 2d sess.; printed also on pp. 1515 et seq., Annual Report of the Chief of Engineers for 1898.) In the opinion of the present board, therefore, reliance in the maintenance of Houston Ship Channel should be placed on dredging, and two dredges of sufficient capacity should be provided as early as possible in order that they may be available as soon as this channel has been completed (probably July 1, 1914).

27. There is no way in which a dike or dikes for the Houston Ship Channel could operate in lieu of the dike previously recommended to be built north of the Texas City Channel for the protection of the latter. The distance between these channels is so great that the effect of waves and currents upon the loose material forming the bottom of the bay in the large area between them would be of great detriment to the Texas City Channel, and the effect of any dikes along the Houston Ship Channel would be inappreciable in affording protection to the former.

28. Had the Houston Ship Channel been located along the west shore of Galveston Bay and close thereto, as was at one time proposed, it could have been led into the Texas City Channel at its shore end and followed it thence to the deep water of Bolivar Roads. The channel, however, has been definitely located in its present position and the work of excavating it is covered by contract now in process of execution, so that no change in its location now appears to be possible.

TEXAS CITY CHANNEL.

29. Next to Galveston Channel, Texas City Channel carries the largest portion of the commerce passing through the port of Galveston. This channel was started by private parties, who first excavated it to an 8-foot depth, and by their successors it was enlarged to a depth of 16 feet. Concerning this channel Maj. Oakes states as follows:

> The cost of the 8-foot channel is unknown to this office, but, according to the Texas City Transportation Co., $146,000 was expended in excavating the 16-foot channel. This channel, however, soon filled, and the project was then brought before Congress and an appropriation of $250,000 was made to provide a channel 25 feet deep, with a bottom width of 100 feet. No examination or survey was authorized by Congress previous to making the appropriation, as has been customary with other river and harbor improvements. It was at that time contended by many that the channel described in the appropriation act, which practically coincided with the 8 and 16 foot channels previously excavated, both of which had filled, was improperly located, in that its direction laid perpendicular to the current. It was then claimed that it would be impossible to keep this channel open at a reasonable expense, and an effort was made to change the location to the route in prolongation of the Galveston Channel. The Texas City Transportation Co. insisted on having the channel excavated as described in the act of Congress, and directions to proceed with the work were issued by the Secretary of War.

30. The bottom width of channel has since been established by Congress at 200 feet. This channel having shown such a tendency to fill or silt up that it has been difficult to keep it open, Maj. Oakes recommended the establishment of a dike along it, which dike was approved, in modified form, by the Board of Engineers for Rivers and Harbors at an estimated cost for the dike alone of $1,432,000. The width of 200 feet has been found inadequate and vessels have had difficulty in navigating the channel not only on account of the constant shoaling but on account of its width, being unable with a beam wind to avoid being blown against the sides. The channel, if it is to serve its purpose, must be made wider than at present, but it is believed advisable to try a width of 300 feet, with the present authorized depth of 30 feet, before incurring the cost necessary to give it a greater width. Meanwhile the cost of maintaining the channel now authorized is estimated to be at least $50,000 annually. A suitable dike along the north side of this channel would materially reduce the cost of its maintenance.

31. It is believed that a suitable dike can be built on the north side of Texas City Channel at less cost than previously estimated. To build such a dike of rock would result in great permanency, but would be costly, as shown by Maj. Oakes's estimate.

32. In view of the fact that there is much clay encountered along the line of this channel it is possible so to cover a timber dike with excavated material as to render it of reasonable permanence. By widening this channel to 300 feet it is believed that enough additional solid material can be obtained for this purpose. Six million four hundred thousand cubic yards would have to be removed, and, at a cost of 12½ cents per cubic yard, this would amount to $800,000 for dredging.

33. The board, therefore, presents an estimate for a creosoted-timber dike, of double-lap sheet piling, with necessary wales and hold-

ing and anchor piles, the sheet piling to have a penetration of at least 15 feet and to extend to 5 feet above mean low tide as follows: Thirty thousand linear feet of dike, at $16 per linear foot, totaling $480,000.

34. Excavation for widening the channel must be so conducted as to protect this dike on both sides with the clay and other hard material encountered, and points of deposit may frequently have to be at greater distance than hitherto from points of excavation. In addition, a certain amount of riprap will be needed to protect the eastern end of the dike and to afford local protection to such parts of the fill behind it where wave and current action tend to cause erosion. It is estimated that 30,000 tons of riprap would be needed, and, at $4 per ton, this would cost $120,000.

35. This gives a total cost of $1,400,000 for the dike and for all new dredging herein proposed for the adjacent channel.

36. A gap 100 feet in width should be left between the western or inner end of this dike and the Texas City harbor line to permit the passage of small boats. It is not now proposed to do any dredging in this gap as it is likely to deepen from natural action. In any event this matter not being of immediate importance can be left for future consideration.

37. With regard to the necessity for a dike along the north side of Texas City Channel attention is invited to the following extract from Maj. Oakes's report of December 30, 1908, above referred to:

> With the exception of the property beyond the sea wall to the east, all of the water front on the Galveston side of the island is now improved up to the end of the Southern Pacific Co.'s wharves. This company has still some unimproved wharf property, and to the west of that lies the property of the Chicago, Rock Island & Gulf Railway Co., and from this point to the bridge no steps have yet been taken to develop the water front, but it is certain that such steps will soon be taken. The channel should be extended westward as fast as wharves and slips are constructed.
>
> Galveston Channel in its natural condition has been maintained by the water flowing through Half Moon Channel and through West Bay along the city water front. The channel maintained by nature was of variable depth and width, but in general it was less wide and less deep than at present. It would be natural, therefore, to expect that the channel as now dredged would not be maintained by nature, and if not maintained by dredging that the channel would revert to its former condition. Such is the case. The natural flow through this channel will not maintain the present depth and width and, in fact, filling is even now taking place. The channel has shoaled until there is now an average depth of about 28½ feet. This shoaling has been caused by the deposit of silt transported by the current from the upper bay through Half Moon Channel into Galveston Channel. On arrival in Galveston Channel the velocity of the silt-bearing current is reduced and the silt deposited in the channel and slips.
>
> Very little, if any, silt is carried by the water coming out of West Bay. If, therefore, we are to widen Galveston Channel to 1,400 feet, the current through the channel will be still further reduced and the deposit of silt accelerated. Either the current from the upper bay through Half Moon Channel must be shut off or a large amount for maintenance must be expended annually.
>
> The dike on the north side of the channel from Twenty-third Street west is at the present time in danger of being washed out and the dredged material which was deposited over the dike washed into the Galveston Channel by storm tides passing through Half Moon Channel and across the dike into Galveston Channel. This has already occurred opposite the Southern Pacific Co.'s property, where a portion of the dike was washed out and the material carried into the channel and the slips owned by that company.
>
> If the channel is to be extended farther westward it will, in my opinion, under present conditions, be impossible to hold a pile and brush dike on the north side of the channel beyond the point where it now terminates. If a more substantial dike, made of masonry or concrete, be placed on the north side for the extension of the channel the current could not sweep through Galveston Channel with more than a small percentage of its present force and quantity, as a glance at the map will show that a further extension of the dike will tend to cut the current off and back the water up so

that more will pass out through the Bolivar Roads and less through Galveston Channel, in which case the current in Galveston Channel will be still further decreased, with an increased deposit of silt. Again, if a more substantial dike be constructed as the channel is extended westward the dike already in place would be endangered because the water being held back farther west would tend to break through to the east and thus seriously endanger the present channel. If this silt-bearing current from the upper bay can be entirely cut off, it would then be possible to develop Galveston Channel in any direction and to any width and depth desired, with very little cost of maintenance. A study of the existing physical conditions in connection with plans for further development of this harbor leads to the inevitable conclusion that the current sweeping down from Galveston Bay through Half Moon Channel and then through Galveston Channel must be cut off.

As this same current sweeps directly across the Texas City Channel and fills that channel with silt so rapidly that it is impossible to keep it open for any length of time after dredging, it is desirable that the structure used to cut off the flow from the upper bay through Galveston Channel and to protect the inner basin should also be located so as to protect the Texas City Channel. Furthermore, such structure may be of use in providing a means for railroads to reach Pelican Island and Pelican Spit on the north side of Galveston Channel, and enable these flats to be developed at an early date. A dike located approximately parallel to the Texas City Channel extending from the mainland to Pelican Flats would fulfill the required conditions.

It is possible also that such a dike would tend to improve conditions in connection with the Galveston Ship Channel connecting with Buffalo Bayou, because the resultant of the forces acting on the tidal flow from the upper bay would, after construction of the dike, lie approximately along the axis of the Galveston Ship Channel. Such a dike, by reducing the flow through Galveston Channel, would also probably reduce the curvature of the channel between the jetties by cutting off the strong current through Galveston Channel, which enters Bolivar Roads at right angles to the current through Bolivar Roads, thus reducing one component of the forces which now tend to push the channel over against the north jetty. Some reduction of the curvature of the channel between the jetties and across the ocean bar would, in my opinion, result from the reduced flow through Galveston Channel.

38. The board concurs in general with Maj. Oakes's view. The dike along Texas City Channel is much more than a local benefit to Texas City. While distinctly of such local benefit, it is primarily of general benefit in permitting a much greater increase in terminal facilities at both Galveston and Texas City and at points between them, including Pelican Island and Spit.

39. Until such dike is constructed the maintenance cost of all these channels will be excessive and their further extension or deepening of doubtful advisability. In this connection the board invites attention to the accompanying statements regarding maintenance dredging at Texas City and Galveston Channels and their adjacent terminals by the Government and by the various terminal interests. These statements indicate a necessity under existing conditions of removing from these channels and their adjacent slips 1,500,000 to 2,000,000 cubic yards of deposit annually. A failure to do this maintenance work promptly and regularly often causes interference with the commercial utility of the port.

40. As the construction of the Texas City Dike, by closing Half Moon Channel, will cause changes in the direction of the bay currents, it is thought that some protection along the north side of Pelican Island and Spit may prove necessary, in order to prevent such erosion there as might tend to cause a channel to break out across them. It is estimated that sufficient protection for this purpose will be afforded by an apron of riprap along the edge of the channel bank north of these islands, and the board submits an estimate of 90,000 tons of riprap for this purpose, which in place would cost $3.50 per ton, or a total of $315,000.

41. It is recommended, however, that the actual placing of this protection be postponed until such time after the completion of the Texas City Dike as further evidence for its necessity becomes manifest, and no appropriation for this purpose is needed for the present.

GALVESTON CHANNEL.

42. The larger portion of the commerce of the harbor has so far been carried on through the so-called Galveston Channel, which is that portion immediately north of and adjacent to Galveston Island and the city of Galveston. Maj. Oakes recommended that this channel be given a width of 1,400 feet between harbor lines east of Fifty-first Street in Galveston city. The project then adopted by Congress called for a channel 1,200 feet wide and 30 feet deep between harbor lines to Fifty-first Street in Galveston, and then 700 feet wide to Sixty-sixth Street. The Board of Engineers for Rivers and Harbors recommended that that project be modified to provide for a width of 1,000 feet between Fifty-first Street and Fifty-seventh Street, as it believed that width would adequately subserve the interest of commerce for many years to come, and this addition to the project was authorized by Congress. The business interests involved were at that time and still are quite desirous of a greater width, alleging the difficulty of turning the largest craft in the harbor when two or three vessels were lying across the ends of pier-heads, and it was also stated that the greater width was desired to allow vessels to anchor in the channel.

43. It is believed by the board, however, that consideration of the question of widening Galveston Channel and also the question of its further extension westward, together with the general question of deepening all these inner channels to 35 feet, be postponed until such time as the Texas City Dike has been completed and a demonstration made as to the depth that can be obtained in the entrance channel by dredging alone. Meanwhile it is estimated that the cost of maintenance dredging in Galveston Channel in order to preserve existing conditions will be $75,000 annually.

PORT BOLIVAR CHANNEL.

44. With regard to the channel to Port Bolivar, it is recognized that while its protection by a dike or dikes would materially diminish the difficulty of maintaining it, such dikes could not be constructed without forming a material decrease of cross section of the gorge of Galveston entrance, resulting in a diminution of the tidal flow that is essential to the maintenance of suitable depths on the outer bar. For this reason the only practicable way to maintain the Bolivar Channel at its present authorized depth of 30 feet is by dredging, estimated to cost $25,000 per annum. The board therefore recommends that the maintenance dredging of Bolivar Channel be continued and that the location and dimensions of this channel and its turning basin be not changed for the present, but that they be held subject to change to accord with prevailing conditions whenever the question of deepening and otherwise enlarging the interior channels again arises or when the commerce peculiar to Port Bolivar requires increased facilities.

EXTENSION OF SEA WALL.

45. The board also wishes to invite attention to another matter of great concern to the safety of Galveston Harbor. This relates to the easterly end of Galveston Island and especially to the narrow neck just east of the sea wall of the city of Galveston and between that and Fort San Jacinto.

46. Prior to the construction of the jetties a channel known locally as the Hospital Channel from time to time existed across this neck and vessels occasionally used it in passing between Galveston Bay and the Gulf of Mexico.

47. When the jetties were built, a long extension was made to the South Jetty, known as its shore arm, practically at right angles to the general direction of the jetty and extending to comparatively solid ground in the city of Galveston. This shore arm crossed the old Hospital Channel, causing it to fill, and thus in a measure protected the jetties from being "flanked" by the enlargement of a channel to the south of them which would have produced shoaling in the main entrance.

48. At the time of the great storm of 1900 the water rose from 12 to 14 feet above its usual level, and this storm tide was accompanied by wind of hurricane velocity. Waves and currents swept across the east end of Galveston Island, badly wrecking the shore arm of the South Jetty and making a large fill in the easterly end of Galveston Channel. This caused an immediate and serious obstruction, and it became necessary at once to procure such dredges as were available and at such terms as could be had to dredge a channel through the deposited material so that the commercial business of the port could be continued. The restoration of this channel to its original dimensions required months, and this with the repair of the shore arm of the South Jetty has once more produced normal conditions in this locality.

49. Meanwhile the city of Galveston has protected itself with a sea wall and has raised its grade so that, with a recurrence of such a storm as that of 1900, water forced across the east end of the island will be unable to find relief by spreading over the city, and its force will be concentrated more strongly than in 1900 upon this narrow neck where once existed the Hospital Channel. The shore arm of the South Jetty while now somewhat stronger than in 1900 can not form an efficient obstacle to this increased force that might thus come against it, and the result might easily be disastrous to the inner harbor and by possible resultant flanking of the jetties to the entrance channel between them. The situation, while satisfactory under normal conditions, is far from safe in the event of the repetition of a storm approaching in violence that of 1900.

50. The Government has an interest in this matter, apart from the maintenance of Galveston Harbor and entrance. At the extreme east end of Galveston Island lies the military reservation of Fort San Jacinto, upon which have been erected the most important fortifications for the defense of the port, as well as the depot, shops, and wharves of the Engineer Department.

51. As matters stand to-day the batteries at Fort San Jacinto have individually been rendered practically secure from destruction by such a storm as that of 1900, but the reservation as a whole is a low

sandy area more or less covered with water, and affords no secure or suitable place for a garrison nor can the necessary line of communications be established between the reservation and the city. As a result the batteries are looked after by a small detachment of soldiers acting as caretakers, and the proper manning of these batteries and their effective use in defensive operations would be a matter of great difficulty and might prove to be impossible under unfavorable conditions.

52. To remedy this situation and to provide a location for a garrison the Engineer Department has had under consideration the protection of the Fort San Jacinto batteries by a sea wall, similar to that of the city of Galveston, and the raising of the grade inside of this sea wall to a level with it, thereby forming an isolated area or island with an elevation slightly greater than that reached by the water during the storm, much as has already been done at Forts Travis and Crockett. This plan, while providing local safety for a garrison at Fort San Jacinto, does not provide for a line of communication between that garrison and the city. If carried out, it will still further aggravate storm conditions along the line of the old Hospital Channel and would render the cutting of a channel across the island at this point practically certain should such a storm as that of 1900 recur, with great resultant damage to the harbor, and with a probably blockade of its commerce.

53. Sooner or later this situation will have to be remedied. The most desirable method, one which will not only protect this narrow part of Galveston Island from being breached by a storm, but will also provide suitable communications to and from Fort San Jacinto and protection for its garrison, would consist in an extension of the Galveston sea wall from its angle at Sixth Street and Broadway to and around the Fort San Jacinto batteries, thence following the south jetty and just inside thereof to the intersection of said jetty with the present southern boundary of the reservation. Such a sea wall with a suitable fill behind it would not only afford all necessary facilities for a garrison at Fort San Jacinto and for its communications, but would render Galveston Harbor safe from obstruction by such a storm as that of 1900. It would also render impossible any flanking of the jetties by the cutting of a channel to the south of them and would permit the erection of wharves along the channel from the eastern end of the present wharves to the boundary line of Fort San Jacinto Reservation.

54. The work described would be of benefit in part to the harbor and in part to its defenses, and its cost should be shared by the two organizations of the Government concerned. There would also be a benefit accruing to the city of Galveston and to the owners of land between Fort San Jacinto and the present protected portion of the city of Galveston, and the interests thus benefited should bear some equitable portion of the cost.

55. So far as the protection of the harbor is concerned, it is believed that this can be effected by the extension of the Galveston sea wall from its angle at Sixth Street and Broadway to a point abreast and in front of the nearest battery at Fort San Jacinto, a total distance of 10,300 feet, and its connection with that battery by a wall of heavy riprap which would so unite the end of the wall with the storm protection of the battery as to afford temporary security to the

exposed end of the wall until such time as its further extension might be undertaken in the interest of affording protection to the fortifications and their garrison.

56. This proposed extension of the sea wall for 10,300 feet is believed to be that portion of the whole sea-wall plan above suggested that peculiarly pertains to the protection of the harbor, to the extension of its facilities, and to the prevention of its blockade by storms. The wall should be similar to that now in front of Galveston, and it should be backed by enough filling to give a width of 200 feet from the edge of the wall to the rear crest of the fill. Beyond that crest the material should be given such slope as it would naturally assume as a hydraulic deposit—probably 1 on 30. The front part of the fill next the concrete should be protected by a sidewalk and brick paved roadway as has been done in the Government's similar extension of the sea wall to and in front of Fort Crockett and the top of the fill between this roadway and its rear crest should be protected from the blowing away of its material by suitable soil covering and vegetation.

57. In addition any appropriation that the Government might make toward this extension of the sea wall should be contingent on a satisfactory cession to the United States, free of cost, of all land east and north of a line originating at the intersection of the center line of the south jetty with the present southern boundary of the Fort San Jacinto Reservation and extending thence approximately south 16°, east to the Gulf of Mexico (this line being made parallel to the numbered streets of the city of Galveston). It is estimated that the triangular area thus donated to the Government between this line and the extended sea wall and the present southern boundary of Fort San Jacinto will contain 600 acres.

58. In addition, the Government's appropriation for such extension of the sea wall should be contingent upon the quieting of any claims that may be outstanding to the present Fort San Jacinto Reservation.

59. The Government's appropriation for such extension of the sea wall should furthermore be contingent upon local interests providing for the building of that portion of the extension which lies between the angle of the present sea wall at Sixth Street and Broadway and the above new boundary proposed for the Government reservation. It is estimated that this will require the building of 3,300 feet of wall, with the fill immediately behind it, by the local interests, and 7,000 feet further by the United States, the estimated cost of the latter including contingencies being as follows:

Wall and riprap	$550,000
Fill	375,000
Pavement and roadway	60,000
Soil covering	200,000
Total	1,185,000

SUMMARY.

60. In conclusion, the recommendations of the board are summarized as follows:

Entrance channel.—That the entrance channel be deepened to 35 feet at mean low tide provided such deepening can be secured and maintained by dredging alone; and that $200,000 per annum for three years be appropriated for the purpose of determining experimentally the feasibility of such deepening.

Depth of interior channels.—That until the results of dredging on the bar with a view to obtaining 35 feet have demonstrated that such a depth can be secured and maintained by dredging, no depth greater than 30 feet in the interior channels be attempted, and that in any case the deepening of Texas City and Galveston Channels beyond 30 feet be not undertaken until a dike has been provided that will protect Texas City Channel and that will incidentally afford protection also for Galveston Channel against shoaling to the extent now prevailing.

Houston Ship Channel.—That the protection of this channel by dikes be not undertaken, but that it be maintained by dredging, for which purpose two suitable dredges should be provided.

Texas City Channel.—That a dike be built along the northerly side of this channel for its protection and that the channel be widened to 300 feet with depth of 30 feet, at a total cost of $1,400,000, the widening being incidental to the construction of the dike and to provide material in connection therewith. Also, that the maintenance of the channel by dredging be continued meanwhile at an estimated cost of $50,000 per annum.

The construction of the dike and the widening of the channel should be authorized by continuing contract covering the entire work, or in case that is not done the first appropriation for the work should not be less than $750,000 and the work should not be begun until that amount is available, in order to permit of its safe and economical conduct. Any appropriation made for the construction of the dike and the widening of the channel should be contingent upon the setting aside by the town of Texas City of a suitable right of way for a railroad or railroads through the said city within its limits, said right of way to be available to any railroad or railroads that may at any time be authorized by the United States to occupy or operate over said dike. Also, that in connection with this work the northerly side of Pelican Island and Spit be protected by a riprap apron, at a cost of $315,000, the undertaking of this riprap work to be deferred, however, until such time after the construction of the dike as the necessity therefor may become manifest.

Galveston Channel.—That no change in the project dimensions of Galveston City Channel be made at this time, but that the maintenance of the channel be continued by dredging, at an estimated annual cost of $75,000.

Bolivar Channel.—That no change in the project dimensions of Bolivar Channel be made at this time, but that the maintenance of the channel be continued by dredging, at an estimated annual cost of $25,000.

Extension of sea wall.—That, for the protection of the harbor from blockade by storms and to permit an extension eastward of its wharf facilities, as well as for other reasons, the United States build 7,000 feet of sea wall, with suitable backing, at an estimated cost of $1,185,000, said work, however, not to be undertaken until the city of Galveston and other local interests first donate certain lands to the Government, quiet all claims to the present San Jacinto Reservation, and provide for the construction of 3,300 feet of similar sea wall extension, all as described above in this report.

The above appropriations aggregate as follows:

3 years' dredging of entrance channel	$600,000
Texas City dike and channel	1,400,000
Protection of north side of Pelican Island	315,000
Sea wall extension	1,185,000
Total	3,500,000

61. In addition to these items, the maintenance dredging of existing channels at Port Bolivar, Texas City, and Galveston must be regularly continued at a cost of $150,000 per annum. All these estimated costs include the usual allowances for office expenses and contingencies.

62. Of these amounts, the $315,000 need not be appropriated until after the completion of the Texas City dike and the necessity for the Pelican Island protection becomes manifest.

63. The $1,185,000 for the 7,000 feet of sea wall extension should not be expended until all of the conditions above described have been complied with by the local interests.

64. This leaves $2,000,000 necessary for the work to be promptly undertaken. Of this, $200,000 will be needed each and every year for 3 years and the balance, $1,400,000, for the Texas City dike and channel, should be either made available for a continuing contract, or not less than $750,000 of it should be appropriated in one sum and should be available before work of construction of the dike is commenced, as this structure can not be built piecemeal.

65. If rock for river and harbor purposes could be admitted free of duty, considerable saving might be effected on these Texas works by the use of rock from Mexico or elsewhere.

66. An outline map showing the general location of the various places mentioned above accompanies this report.

Respectfully submitted.

EDW. BURR,
Colonel, Corps of Engineers.
LANSING H. BEACH,
Lieut. Col., Corps of Engineers.
C. S. RICHÉ,
Lieut. Col., Corps of Engineers.

ON

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1391.

TERRY CREEK AND BACK RIVER, GA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF TERRY CREEK AND BACK RIVER FROM THE MOUTH TO ITS JUNCTION WITH MACKEYS RIVER, TRIBUTARY TO BRUNSWICK HARBOR, GA.

February 12, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 11, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 10th instant, together with copies of reports from Col. Dan C. Kingman, Corps of Engineers, dated September 5, 1912, and January 14, 1913, with map, on preliminary examination and survey, respectively, of Terry Creek and Back River from the mouth to its junction with Mackeys River, tributary to Brunswick Harbor, Ga., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 10, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Terry Creek and Back River from the mouth to its junction with Mackeys River, tributary to Brunswick Harbor, Ga.

1. There are submitted herewith, for transmission to Congress, reports dated September 5, 1912, and January 14, 1913, with map,

by Col. Dan C. Kingman, Corps of Engineers, on preliminary examination and survey, respectively, of Terry Creek and Back River from the mouth to its junction with Mackeys River, tributary to Brunswick Harbor, Ga., called for by the river and harbor act approved July 25, 1912.

2. Back River is an estuary of St. Simon Sound and forms the easterly boundary of the peninsula on which is situated the city of Brunswick. Terry Creek is a tributary of Back River, extending through the marsh up to the highland near Brunswick. Improvement of these waterways is desired in order to make available cheap sites for manufacturing. In addition, Back River is a part of a sheltered inland waterway route from the Altamaha River to Brunswick Harbor. The existing route affords a depth of 7 feet at mean low water, in general, but there is one point in Back River where the depth is considerably less, and this shoal constitutes an obstruction in the sheltered route. The district officer, who is also the division engineer, states that the improvement of Back River to a depth of 17 feet at low water, as an extension of the harbor of Brunswick, would be expensive, and he does not recommend such an improvement at this time. but he is of opinion that this river is worthy of improvement, as part of the inland waterway, to the extent of removing the shoal above referred to, the cost of which is estimated at $5,000.

3. The improvement of Terry Creek is desired by several industries located on the creek and by the city of Brunswick, which is making arrangements for suitable approaches to this territory and promises to reserve a frontage of 1,000 feet on the creek for a public dock. The district officer states that extensive private improvements to existing plants are dependent upon the improvement and development of this creek. He submits an estimate in the sum of $127,000, covering the creation of a channel 17 feet deep at low water and 100 feet wide in the straight portions, with a proper widening at the bends. He states that this improvement is undoubtedly worthy of being undertaken, but that it is a question whether all or any part of its cost should be borne by the United States, and he is of opinion that the question of local contribution should be determined by Congress.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 27, 1913. The board states that the benefits from the proposed Terry Creek improvement would be largely confined to a few industries, and the work would be in the nature of terminal facilities or of an auxiliary channel for the purpose of reaching factories which for economical reasons have been located on the creek and not on the deep channels provided by the United States. The board does not believe that this work should be undertaken by the United States. The board, however, concurs with the district officer in believing that it is advisable for the United States to undertake the improvement of Back River in the manner proposed at an estimated cost of $5,000.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement of Terry Creek, Ga., in the manner apparently desired by the interests concerned, as described in the

reports herewith, is not advisable at the present time; and concurring also with the views of the district officer and the Board of Engineers for Rivers and Harbors as to Back River, I report that the improvement by the United States of Back River, Ga., is deemed advisable so far as to secure an available channel depth of 7 feet and a channel width of 150 feet, increased at entrances and on curves, at an estimated cost of $5,000 for first construction, this estimate being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimate.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
January 27, 1913.

The Chief of Engineers, United States Army:

1. This is a report of survey of "Terry Creek and Back River from the mouth to its junction with Mackeys River, tributary to Brunswick Harbor, Ga." Mackeys River forms a connection between the Altamaha River system and St. Simons Sound and Brunswick Harbor. Back River starts from Mackeys River at a point about 7½ miles above its mouth and joins it again as it enters St. Simons Sound. Terry Creek is a tributary of Back River. Near its source it skirts the high ground along the eastern part of the city of Brunswick and then passes through marshland and enters Back River at a point about 2½ miles above the mouth of the latter.

2. Back River, in connection with Club and Plantation Creeks, forms a part of the inland route traveled by river steamers between the Altamaha River and Brunswick. The inland route has generally a depth of 7 feet, except for a short distance near the head of Back River, where the depth is only about 4 feet. The improvement desired in Back River, as a component part of the inland route, is the removal of this shoal. It is estimated that a suitable channel 7 feet in depth at low water and 150 feet bottom width will cost in round numbers $5,000, and this work is recommended by the district officer, who is also division engineer.

3. Improvement is also desired in the lower part of Back River in order that seagoing vessels may reach the sawmills located upon its banks. This would require a depth of 17 feet at mean low water, and the district officer states that this work would be expensive and can not be recommended.

4. Several industries have been located in the eastern part of Brunswick upon or near the banks of Terry Creek, which is now used for barge and light-draft boat navigation. The city of Brunswick is interested in the improvement of this creek and proposes to acquire 1,000 feet frontage on the creek to be used for municipal dock purposes. The improvement desired is a channel 17 feet deep and not less than 100 feet wide in straight reaches, with suitable widening at the bends, the estimated cost of which is $127,000.

5. The district officer states that this improvement is undoubtedly worthy of being undertaken, but that it is a question whether all or any part of its cost should be borne by the United States and that it is a case where the locality would derive special advantages. He believes that if local cooperation is called for, the amount demanded should not exceed one-third of the cost of the project. He concludes with the opinion that Terry Creek and Back River are worthy of improvement to the extent of a channel 7 feet deep in Back River, at a cost of $5,000, the entire expense to be borne by the United States, and of a channel 17 feet deep in Terry Creek, at a cost of $127,000, the question of local contribution to be determined by Congress.

6. The present commerce of Terry Creek is reported to be about 90,000 tons, having a value of $950,000, and of Back River about 25,000 tons, having a value of $250,000. The greater part of the latter is sawn lumber which is first brought from the Altamaha River system as raw material in rafts.

7. It appears that the improvement of Back River is desired for two purposes—one, in order to reach the existing sawmills located on its banks, which now operate medium draft ocean vessels by taking advantage of the tides, and the other, as a part of the inland route connecting the Altamaha River system with Brunswick. For the first, a considerable expense would be entailed, and it is not believed that the existing and reasonably prospective commerce to be affected thereby is sufficient to justify the improvement. The cost of suitably improving Back River so as to make it a part of the sheltered inland route appears reasonable, and in the opinion of the board it is advisable for the United States to undertake this work. No estimate for maintenance is given, but it does not appear that this item would be large.

8. The improvement of Terry Creek presents a different aspect. This is a small stream which passes through marshes and heads but a few miles from its mouth. It appears that its banks are sought by manufacturing concerns because of the cheaper sites there than along the improved channel west of Brunswick. The United States has been engaged for a number of years on the improvement of Brunswick Harbor and has provided commodious channels at its entrance and along the western city front, at an expenditure of over $1,300,000. The benefits from the improvement now sought would be largely confined to a few industries, and the work would be in the nature of terminal facilities or of an auxiliary channel for the purpose of reaching factories which for economical reasons have been located on the creek and not on or adjacent to the deep channels afforded by the United States in connection with the general improvement of the harbor. The board does not believe that this work should be undertaken at the expense of the United States.

9. In conclusion, the board reports that in its opinion it is advisable for the United States to undertake the improvement of Back River by the construction of a channel 7 feet deep at low water and 150 feet bottom width, as proposed by the district officer, at an estimated cost of $5,000, but that it is not advisable at this time to undertake the improvement of Terry Creek.

10. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated

therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF TERRY CREEK AND BACK RIVER, GA.

War Department,
United States Engineer Office,
Savannah, September 5, 1912.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Terry Creek and Back River, Ga.

1. The city of Brunswick, Ga., is upon the westerly side of a peninsula bounded by East River, Brunswick River, St. Simons Sound, and Back River. The high ground extends less than halfway from East River across to Back River. For the rest of the way it is salt marsh. Navigable water is carried up near the high ground by Terry Creek. The improved harbor of Brunswick fronts on East River.

2. Now, in order to provide more room, a desire is expressed for the development of Terry Creek and Back River. To compare small things to great, the situation is something like that of New York, between North River and East River.

3. A preliminary examination has been made by Assistant Engineer W. C. Lemen, and his report and sketch are transmitted herewith. The report and the accompanying correspondence[1] indicate that quite a large business could be expected at once, if this improvement were made. Apparently, the advantage to commerce would be sufficient to justify a considerable outlay. What this outlay would be and exactly what form the improvement should take can be determined by a survey.

4. I am of the opinion, therefore, that it is worthy of a survey, and I would recommend that an appropriate allotment for the purpose be made.

Dan C. Kingman.

[Second indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, September 23, 1912.

The Chief of Engineers:

1. From the information presented, it appears that there is considerable commerce at present on these waterways and that it is reasonable to anticipate a material increase in case better navigation facilities are provided. The district officer states that apparently the advantage to commerce would be sufficient to justify a considerable outlay.

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[1] Not printed.

2. In the opinion of the board the advisability of the United States undertaking this improvement is dependent upon its cost, and the extent of local cooperation, and therefore it concurs with the district officer in recommending the authorization of a survey to determine these matters.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board

REPORT OF ASSISTANT ENGINEER W. C. LEMEN.

United States Engineer Office,
Brunswick, Ga., August 30, 1912.

Sir: I have the honor to submit the following report upon a preliminary examination of "Terry Creek and Back River from the mouth to its junction with Mackays River, tributary to Brunswick Harbor, Ga.," as provided for in the river and harbor bill passed in the last Congress and approved July 25, 1912.

LOCATION AND GENERAL DESCRIPTION.

2. Back River is an estuary of the sea, and in conjunction with Mackays River, Frederica River, and Brunswick River forms St. Simon Sound. The general course of the same is parallel to the waters that form and are termed Brunswick Inner Harbor, but lies to the eastward of the port of Brunswick; that is, the city of Brunswick is situated on a peninsula formed by Back River and Brunswick River, as shown on the accompanying sketch. About 7½ miles from its mouth it combines again with Mackays River and forms a link in the protected waterway from the Altamaha River system and inside water route to the port of Brunswick. This body of water, with a total length of about 7 miles, has an average width of about 1,000 feet. Tributary to and entering Back River about 2½ miles from its mouth a waterway leads off from the same through the marsh to the highland forming the Brunswick peninsula; this is Terry Creek, and for the upper portion of the same has a general direction parallel to the bordering highland.

3. The controlling depths of Back River, according to an old Coast Survey chart, are approximately 17 feet at its mouth, 10 feet above the mouth of Terry Creek and below the wharves of the Hilton & Dodge Cypress Mills, 12 feet between this locality and the old Taylor-Cook Co. sawmill, and 3½ or 4 feet at its junction with Mackays River. The lower portion of Terry Creek has three shoals in it, the lower of which has 8 feet at low water, and the two upper 13 feet. The upper portion of this creek, however, after it is broken up into a number of small tributary streams, becomes too crooked and shallow for any considerable navigation of the class considered necessary for the shipping that is rapidly developing on the upper banks of this stream.

4. The rise and fall of tide is approximately 7 feet.

5. Upon Back River there are at present situated two sawmills, viz, the Hilton & Dodge Cypress Mill, located about one-half mile from the river on the mainland, with tramways leading to their loading wharves, and the Taylor-Cook Co. sawmill, located on the immediate bank of Back River. The former mill is in operation, but owing to financial difficulties, the operation of the latter has been suspended for the past two years.

6. Upon the upper portion of Terry Creek there are at present located three manufacturing concerns, viz: The Yaryan Naval Stores Co., the Georgia Veneer & Package Co., and the Glynn Canning Co., the first two of which have been built within the last 18 months and the former within the last five years. There are other concerns seeking manufacturing sites in the vicinity of Brunswick, but, as a rule, the present water front—i. e., on the East River side—is practically all taken up by railroad terminals and forwarding agencies, and even if there was space for the accommodation of factory sites, the same would be entirely too expensive for use in that respect; and the area adjacent to the bodies of water under consideration is the natural location for cheap and commodious sites for this purpose. The locations of these plants are shown on the accompanying sketch.

7. These established industries seek the improvement of this waterway with the view of the further development of their plants and the economical shipment in of the raw material and out of the finished products by coastwise vessels.

8. In addition to the above, this portion of Back River forms a portion of the protected route from the Altamaha River system to the port of Brunswick and the connecting or opening of this river with Mackays River is restricted by the shoal existing at that point. While the water here might be considered as adequate for the general use of the style of river boats that navigate the Altamaha system of rivers, even they are delayed at times if this point is reached at low water, and there is a great deal of traffic moving over this portion of the route by tugs which necessitates a greater depth of water than is found at this shoal, with the consequent delay to towing due to waiting on tides to carry them over this shoal.

9. The shipping at the docks in Back River is limited to the depths found upon the shoals in that vicinity. In the case of Terry Creek there has been no attempt to ship the finished products by means of chartered seagoing vessels, owing to the lack of depth and the shape of this waterway These interests are, therefore, requesting an improvement of this waterway with the view of enabling them to increase the draft of the vessels in Back River shipping to at least the controlling depth at the mouth of Back River and the opening up of the shoal at the head of Back River to at least a depth of 7 feet at low water for the accommodation of the general draft necessary on the inside water route and the straightening and deepening of Terry Creek to the same depth as that for Back River, i. e., 17 feet at low water.

10. There is given below copies of letters received from the industries interested, and in addition a general request of the local board of trade for an investigation into this improvement.

* * * Our plant was completed and commenced operations in February, 1912, and up to this month has consumed an average of 300 tons of raw material per day. During the month of July we produced 1,500 tons of rosin and 60,000 gallons of turpentine and oils.

We have been using Terry Creek for the transportation of our products, as follows: 150 tons of raw material inbound per day, value, $400; 40 tons of outbound finished products per day, value, $2,000.

We are just completing the doubling of our plant, and have commenced operations with double capacity this week.

Terry Creek is very crooked and rather narrow, which makes it expensive for our operations.

We have completed plans for the erection of a large wood-pulp mill adjoining our factory to use our waste product, and this plant will commence with a production of 175 to 250 tons of pulp per day, which we expect later to increase to 500 tons per day. It is our wish to transport this pulp direct with schooners to paper mills in the North. We have already built a slip from Terry Creek to our plant, and have constructed our own dock, With double capacity we are now using 600 tons of raw material per day, and we would like to bring in at least half of this supply by water.

If Terry Creek is improved, straightened, and deepened, so as to make it navigable for schooners for shipment of our products North, we would use Terry Creek to at least the following extent: 350 tons inbound raw material per day, value, $1,000; 250 tons outbound finished products per day, $15,000.

In addition to the above figures we would use Terry Creek for transportation of supplies, products, and material for from 20 to 40 per cent in excess of the above statement.

The improvement of Terry Creek would be of great benefit to our industry, and if we knew within the next six months that this improvement was to be made, we would spend at least $500,000 in the construction of additions to our plant within the following 12 months.

The raw materials which our company use are all waste products, and if we can secure cheap transportation on our pulp to northern mills we would increase the products of our pulp factory so as to produce from 500 tons to 1,000 tons of pulp per day.

The Yaryan Naval Stores Co.,
By Jas. S. Brailey, Jr., *President.*

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* * * Beg to say that for the past 12 months we have handled approximately 4,680,000 feet of logs, and as you know the tonnage on this number of feet of round logs is 14,040 short tons. This, of cource, all comes over the waterways mentioned in your letter, the same getting to us in rafts.

In addition to the above, we have handled over this same waterway during the past 12 months approximately 400,000 feet of lumber, or 1,200 tons. This lumber, of course, comes to us on lighters or barges.

In regard to handling our outgoing stuff over this same waterway, we beg to advise that we anticipate developing quite a business in the West India Islands, and other islands in this section, and in fact, since locating here about two years ago, we have shipped one cargo of 500 tons to Porto Rico. This, of course, we had to load on cars, having the cars switched to the Brunswick Steamship Co.'s docks, where it was loaded on schooner. Had it been possible to get this schooner around to our place, we could have loaded same direct to schooner.

As above stated, we expect to develop quite a business with the islands in this vicinity, and it would certainly be a good thing for us if this waterway was opened up sufficient to admit these schooners to come direct to our plant.

Wish to say further that it is quite likely, in order to get the hardwood timbers consisting of the various gums, that it will be necessary for us to have our own steamboat and lighters, and in order to operate these successfully, it would be necessary to have the back waterway going to our plant improved.

Sincerely hoping you may get the necessary appropriation to make the necessary improvements on this back waterway, and assuring you of our highest appreciation of anything you are able to do to this end, we beg to remain,

Georgia Veneer & Package Co.,
By A. L. Church, *President.*

With reference to the preliminary survey of Terry Creek and Back River as relating to the interest of the Glynn Canning Co. I beg to advise that the company at present is very much handicapped for lack of water in this channel. We have considerable traffic inbound consisting of oyster boats and lighters and such river craft. This year we are doubling our capacity and anticipate employing considerable more labor and using larger and deeper draft boats. If we had a depth of 10 feet at low water it would be a great advantage to our organization, as we would be able to ship our finished products in small schooners and other vessels to other coast markets. At present we are not able to do this on account of lack of water.

For your information, I beg to advise that we employ, in season, in round numbers, about 100 to 150 people including 15 to 20 boats, lighters, and other small craft.

Glynn Canning Co.,
By C. A. Taylor, *President.*

We desire to call your attention to the urgent necessity of straightening and deepening Terry Creek. This stream leads up to the very best territory for a factory district that is adjacent to Brunswick.

Three large plants are located on the east bank near the end of its north branch, now. These are the plants of the Georgia Veneer & Package Co., the Glynn Canning Co., and the Yaryan Naval Stores Co.

The deepening and straightening of Terry Creek, making possible navigation by seagoing craft, would result in great saving to the three plants already located on the bank of this stream, and we are reliably informed, would result in heavy improvements and expenditures by them as well as making available valuable factory-site land not now occupied.

In this connection, we might point out that the available water frontage along East River and Brunswick River is almost all in the possession of railways or private interests, making the Terry Creek territory all that is open for factory expansion.

We submit, for your consideration the following statement of commerce of Terry Creek, present and prospective.

Present commerce per year.

Glynn Canning Co., oysters in shell and shells	$22,100
Georgia Veneer & Package Co., logs in rafts and barges B. M. feet, 46,800,000 feet, valued at	46,800
The Yaryan Naval Stores Co., incoming raw material valued at $400 per day; value per year	144,000
Outgoing products, 40 tons per day, value per day $2,000; value per year	720,000
Total present commerce	936,900

One hundred per cent of this commerce moves via Back River.

The statement of the Yaryan Naval Stores Co. is based upon operation during the last six months.

The capacity of the Yaryan Co. has been doubled and beginning this week the incoming of raw material and the outgoing of finished products is double what it was as shown in the foregoing statement.

The actual present commerce of Terry Creek should show for the Yaryan Co.:

Incoming raw material, 300 tons per day, valued at $800, value per year	$288,800
Outgoing products, 80 tons, value per day, $4,000, value per year	1,440,000
Making a grand total of present commerce on Terry Creek	1,796,000

Prospective commerce.

Glynn Canning Co., estimated to double capacity	40,000
Georgia Veneer & Package Co., estimated to more than double capacity	100,000
The Yaryan Naval Stores Co., prospective improvements and extensions to occur inside of two years time, to a total annual commerce	7,000,000
Grand total prospective commerce	7,140,000

In connection with the above we point out that the prospective doubling of the capacity of the Georgia Veneer & Package Co. is a project definitely decided upon by that company.

We believe, from information at hand, that Terry Creek can be deepened and straightened to the extent mentioned and made navigable for seagoing craft at an expense not to exceed $150,000, or approximately 1 per cent of the value of the tonnage that will be transported upon it in a two-year period.

For your consideration, we will add that the Hilton & Dodge Lumber Co. shipped from its Altamaha Cypress Mill Wharf, in seagoing vessels, last year 5,547,000 feet of sawn lumber, valued at $138,675, based on $25 per thousand feet. The actual price ranging from $25 per thousand feet to $30 per thousand.

This commerce should be placed to the credit of Back River only.

Before the close of the week we will submit for your consideration a statement showing the net saving in freight charges that will result to the three plants mentioned through the improvement of Terry Creek.

The Board of Trade,
By J. G. Weatherly, *Secretary.*

PRESENT COMMERCE.

11. During the calendar year of 1911 there was shipped by seagoing vessels from the wharves in Back River, 5,547,260 feet of sawn lumber, or 11,000 tons, valued at $40 per thousand, making a total of $221,880. Most of the above lumber was cypress, accounting for the high unit value.

12. The Yaryan Naval Stores Co. have only been in active operation since February, 1912, but since that time have made use of Terry Creek and Back River for the transportation, by means of small barges, of raw material to the amount of 4,500 tons, valued at $12,000 per month, and have moved, by means of lighters, to such points as to enable them to ship coastwise or foreign 1,200 tons, valued at $60,000 per month, or at an annual rate of, inbound material, $144,000, and outbound, $720,000. During the month of July this plant has doubled its capacity with the consequent doubling of the inbound and outgoing products, making an annual movement of 136,800 tons of merchandise, valued at $1,728,000.

13. This concern has an investment in the local plant amounting to $700,000, with land holdings and stumpage area throughout southeast Georgia valued at $150,000. They employ 500 men in the plant and 700 field men with necessary equipment.

14. The Georgia Veneer & Package Co. during the past 12 months have handled over this waterway 15,240 tons of raw material, valued at $152,400, in the shape of pine logs in rafts and hardwood timber on barges. This plant would use a much larger amount of hardwood timber if adequate water could be obtained for the transportation of the same by lighters, and they state that they desire to put in a line of boats and lighters for the transportation of this class of lumber from the adjacent rivers of Georgia.

15. The above concern has an investment in the local plant of $90,000, with small holdings in lands and timber throughout southeast Georgia, which they intend extending in the near future. They employ some 200 men locally.

16. The Glynn Canning Co., during the oyster season of 1911 (spring and fall), carried through Terry Creek in the shape of oysters in the shell in bulk and oyster

shells to the amount of 10,000 tons, valued at $26,500. This concern has an investment of approximately $15,000, and employ during their season 75 hands. Their raw material comes from the coast marshes entirely, for a range of 40 miles above and below Brunswick.

17. In consideration of the actual and present use of these streams and the prospective development of these and other industries; also in view of the fact that the raw material for these factories comes from a large portion of southeast Georgia, especially that portion adjacent to the numerous waterways leading to this port. (Two of these concerns have large holdings on the following waterways: St. Marys River, Satilla River, Little Satilla River, Upper Turtle River, and the Altamaha River system.) Consequently any improvement that will allow the extension of this class of business will be a material development of the whole of southeast Georgia.

TERMINAL FACILITIES.

18. There are at present two wharves for the shipment of lumber in Back River at the sites of the sawmills, and in the case of the Yaryan Naval Stores Co. they have dredged a basin in the upper portion of Terry Creek for the loading and unloading of lighters, with additional wharf facilities. Small wharves are also constructed adjacent to the other two factories, and assurance is given by these firms that all wharfage facilities will be constructed that are necessary for the receipt of any class of commerce that may seek entrance to this portion of the harbor in the future.

19. In addition to the above, the city of Brunswick has recently had her charter so amended as to allow her to acquire, by purchase or condemnation proceedings, wharf property; to own, construct, and maintain wharfage, and to make such reasonable charge for the same, should such be desired, as she may deem fit and proper. The city at present owns 167 acres of marsh land fronting on Back River, and while her streets do not at present end at Terry Creek it is the intention of her council, I am informed, to extend the same to this waterway, should it be improved.

PROSPECTIVE COMMERCE

20. In connection with prospective commerce it might be well to state that the Yaryan Naval Stores Co. have under consideration and plans are being formulated for the construction of a wood-pulp mill for using up their waste products, fuel for which, viz, crude oil, will be obtained by tank steamers from some base of supply; and, in accordance with their letter, state that if this improvement could be obtained that this pulp mill would be built of double capacity, should they be able to transport this pulp by means of schooners direct to the paper mills of the North.

21. All these interests are awaiting the further development of this waterway with the view of developing and enlarging their plants, as is shown by the letters quoted above, which, if carried out in accordance with their plans, would mean an annual handling, over this one waterway, of merchandise amounting to approximately $7,000,000.

22. If a further examination of this improvement shows that the same can be improved at a cost commensurate with the benefits to be derived, the improvement of this waterway should be made a portion of Brunswick Harbor and thrown into the general improvement and maintenance of the same.

23. The question of development and utilization of water power for commercial purposes does not enter into this improvement.

24. There are no artificial obstructions in the way of bridges to be considered.

25. The present and prospective commercial importance of these waterways appears to warrant an improvement of the same, and it is recommended that the proper surveys be made with the view to formulating a project which will give sufficient depth to enable seagoing vessels to load in Back River and the upper portion of Terry Creek and the making of a waterway for the transportation of material from the Altamaha River system.

Very respectfully,

W. C. LEMEN,
Assistant Engineer.

Col. DAN C. KINGMAN,
Corps of Engineers.

SURVEY OF TERRY CREEK AND BACK RIVER, GA.

War Department,
United States Engineer Office,
Savannah, Ga., January 14, 1913.

From: Col. Dan C. Kingman, Corps of Engineers.
To: The Chief of Engineers, United States Army.
Subject: Survey of Terry Creek and Back River, Ga.

1. The following report is submitted upon the survey of Terry Creek and Back River, Ga., the examination of which was called for by the river and harbor act approved July 25, 1912.

2. The preliminary examination has been made and the project was found worthy of a survey. An allotment for this purpose was provided and the work was done under the immediate direction of Asst. Engineer W. C. Lemen, whose report in full is transmitted herewith. The results of the survey are set forth upon a single sheet, which accompanies this report and which, together with certain index maps drawn upon the same sheet, give a very good idea of the problem presented for solution. The survey was carefully made, as is evidenced by the report, and the results are reliable.

3. The Back River and Terry Creek projects are, to some extent, independent and may be considered separately. We may consider, first, Back River as a part of a specially sheltered inland waterway route from the Altamaha River to Brunswick Harbor, which is the harbor provided for this extensive river system. An important link in this waterway was provided when the Club and Plantation Creeks improvement was carried to completion. The existing route affords a depth of 7 feet at mean low water generally, and to be valuable it ought all to be of at least this depth. There is a point, however, in Back River where the depth is considerably less than this, and this shoal constitutes a serious obstruction in the sheltered route.

4. As seen under paragraph 31 of Asst. Engineer Lemen's report, the removal of this shoal so as to afford a channel 150 feet wide on the bottom and 7 feet deep at low water would require the removal of about 22,000 cubic yards of material, which would cost, in round numbers, $5,000. This improvement is undoubtedly worthy of being undertaken by the General Government and is unconditionally recommended, whether anything more is done at this locality or not.

5. When we come to consider Back River as an extension of the harbor of Brunswick it is found that its improvement up past the sawmills which are now situated upon its banks, so as to afford a depth of 17 feet at low water and a navigable width of 150 feet, would be considerably more expensive, and, after careful consideration, I am of the opinion that it can not be recommended at this time.

6. Passing then to Terry Creek we find a waterway which leaves the lower end of Back River and with a rather winding channel extends close up to the high ground lying just east of Brunswick. It is already being occupied by factory sites and is being made use of for barge navigation or the use of light-draft boats. The map submitted shows its present condition, and the index its position with respect to Brunswick. The photographs[1] which are transmitted in a separate package give a good idea of the character of the improvements which have already been made.

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[1] Not printed.

7. The city of Brunswick desires the improvement and proposes to acquire from the State the ownership of a portion of the land bordering upon the stream, and the mayor of the city, in the name thereof, promises that 1,000 feet frontage on Terry Creek shall be held and operated as a municipal dock for the benefit of the public, without discrimination, so as to afford ample facilities for vessels desiring to use the same. The city is making arrangements for suitable approaches, also, to this territory. Extensive private improvements to existing plants are also dependent upon the improvement and development of this creek.

8. The cost of the improvement is not very great. A channel 17 feet deep and not less than 100 feet wide in the straight portions, with a proper widening at the bends, is estimated to cost $127,000 including contingencies.

9. This improvement, in my opinion, is undoubtedly worthy of being undertaken by somebody. It is a question in my mind whether all of it, or any of it, should be undertaken by the United States. It is one of those cases where the locality derives special advantages from the improvement on account of increased values of real estate and additional objects of taxation. The locality can recoup itself for the cost of the improvement by the increased taxes which will result from it; the United States can not. If this were the first case of the kind that had ever come up for consideration, I should be disposed to recommend that private interests make this improvement themselves. But it is very far from being the first case of its kind. In a very great many instances the United States has made, at its own expense entirely, such improvements as are proposed here. Occasionally it has refused to make them, and they have either been made locally or have not been made at all. The best policy, in my judgment, that could be devised for the treatment of such cases would be an equitable division of the cost of the improvement, the United States to approve the plans and direct the construction in order to see that the interests of the public were protected and special advantages and monopolies prevented. But it does not seem fair to begin this method in the case of a little town whose resources are very small.

10. If local cooperation is called for, in my judgment the amount demanded should not exceed one-third of the cost of the Terry Creek improvement; that is to say, one-third of the $127,000. There is abundant precedent for not calling for any local contribution other than that which was proposed by the city of Brunswick in providing public wharves and landing places.

11. In my opinion Terry Creek and Back River are worthy of improvement to the extent which I have just described; Back River so as to afford a depth of 7 feet at low water, and Terry Creek so as to afford a depth of 17 feet at low water, with the widths heretofore described; the expense of the Back River improvement to be borne entirely by the United States, and the question of local contribution for Terry Creek should be determined by Congress, as that is a matter of policy rather than a question of engineering.

DAN C. KINGMAN.

[For Report of the Board of Engineers for Rivers and Harbors on Survey, see p. 3.]

REPORT OF ASSISTANT ENGINEER W. C. LEMEN.

UNITED STATES ENGINEER OFFICE,
Brunswick, Ga., December 31, 1912.

From: W. C. Lemen, assistant engineer.
To: Col. Dan C. Kingman, Corps of Engineers.
Subject: Report on Terry Creek and Back River, Ga.

1. The following report is submitted upon the survey of "Terry Creek and Back River, from the mouth to its junction with Mackays River, tributary to Brunswick Harbor, Ga.," the preliminary examination of which is called for in the river and harbor act approved July 25, 1912.

2. The report on the preliminary examination of this project was forwarded from this office under date of August 30, 1912, forwarded from Savannah office under date of September 5, approved by the Board of Engineers under date of September 23, and a survey ordered of same by the Chief of Engineers under date of September 28, 1912.

LOCATION.

3. *Back River.*—This is a tidal estuary, which, in conjunction with Mackays River, Frederica River, and Brunswick River, forms St. Simons Sound. The general course of this waterway is parallel with the waters that form and are termed "Brunswick Inner Harbor," but lies to the east of the port of Brunswick, that is, the city of Brunswick is situated on a peninsula formed by Back River and Brunswick River, as can be seen by the index sketch on the accompanying map. About 7½ miles from its mouth it combines with Mackays River and forms a link in the protected waterway from the Altamaha River system to Brunswick, and also affords a somewhat shorter route for vessels bound for Brunswick desiring to make use of the intracoastal waterway.

4. *Terry Creek.*—Tributary to and entering Back River about 2½ miles from its mouth, Terry Creek leads off from the same through the marshes to the highlands forming the Brunswick Peninsula, and the upper portion of this creek has a general direction parallel to the bordering highlands. Leading off from Back River about half a mile from its entrance is Clubb Creek, which has recently been connected with Plantation Creek, and in conjunction with the same forms a protected route for small craft from Back River around to Brunswick Inner Harbor.

GENERAL CHARACTERISTICS.

5. *Back River.*—This river varies throughout the length considered from 500 to 1,750 feet in width, with depths ranging from 4 feet at the controlling shoal at its upper end to 42 feet in some of the deepest pools, and is at present navigated by seagoing vessels, drawing 16 and 17 feet, as high as the mill wharves, about 4 miles from its mouth. The present controlling depth at its entrance is 18 feet, and no shoal of less depth is encountered in the same until after passing the mouth of Terry Creek. Above this point two shoals, approximately 3,000 and 4,000 feet in length each, exist, the first being between the mouth of Terry Creek and the creek just below the Hilton & Dodge mill wharf, and the second between this wharf and the Taylor-Cook mill wharf. The controlling depths on these shoals are 11 and 12 feet, respectively. For a mile above Taylor-Cook docks the river remains of good depth and width, but from above this point to its conjunction with Mackays River, a distance of 1½ miles, there are found two shoals, 1,800 feet in length in all, with less than 7 feet upon them, the first one having a controlling depth of 4 feet.

TERRY CREEK.

6. This waterway, entering Back River about 2½ miles from its mouth, is purely a tide water creek, but affords drainage for a few square miles of watershed on the eastern portion of the Brunswick Peninsula, and to the north of the same, the main portion of this creek being about 3 miles in length, varying in width from 400 feet at its mouth to 150 feet at the upper portion that has been considered for improvement under the survey, with depths ranging from 30 feet in some of its pools to 6 feet in the channel at its upper end. The lower part of the creek is in long, sweeping bends, but the upper portion is narrow and too crooked for navigation by seagoing vessels. After passing over the shoal, some 2,000 feet in length, at its mouth, a considerable portion of this creek has ample depth. The upper portion, after the creek subdivides into North and South Terry Creek, has an average depth of about 7 feet, but is too narrow and crooked for seagoing vessels.

CHARACTER OF SURVEY.

7. The survey of both Back River and Terry Creek was carried out upon the sam general lines.

8. *Triangulation.*—The skeleton of this survey is a system of tertiary triangulati built upon a base determined from the survey of Brunswick Harbor, making use triangulation station "Spot," one of the United States Coast and Geodetic Surv points. The coordinates of these stations, computed for a flat projection, are all ferred to the St. Simon's Lighthouse Triangulation Point, the zero of coordin for all surveys in the vicinity of St. Simons Sound. In all, 23 stations were ins mentally located.

9. *Hydrographic work.*—Back River and Terry Creek throughout were thoroug covered with sounding lines, and all the main and smaller creeks leading therein out with sufficient accuracy to give a good general idea of their course, character, capacity. These sounding lines varied in distance apart from 100 to 400 feet, depe ing upon the probability of later improvement being desired. In all, 573 cross-secti lines and longitudinal lines were run, 2,742 instrumental locations made on th sounding lines, and 8,850 separate soundings made. In addition to the soundi taken, 38 borings were made in Back River, and 37 in Terry Creek, with a view determining the nature of the material forming the shoals in these waterways.

10. *Topographical features.*—The general elevation of the marshes was determin by observations of the same in connection with the height of the water at mean hi tide. The eastern portion of the city of Brunswick, proper, was surveyed by mea of a traverse line and connected on to the main triangulation system, using horizont angles and stadia distances, the dividing line between the highland and the mar being delineated along this side of the city, and also the eastern boundary of tow commons, which forms the main property division line of the city, desirable later f the determination of the necessary rights of way for the proposed improvement. I conjunction with this topographical work, a line of levels was carried for the deter nation of elevations and the checking up of certain tidal gauges used in conjuncti with the sounding work.

11. *Levels.*—Just prior to the commencement of this survey a line of levels co necting the mean low water plane at St. Simons Lighthouse and the mean low wate plane at Brunswick Inner Harbor, had been completed. Spur lines from this main lin of levels were run from Back Landing up along the highlands and out to the we shore of Back River at Cypress Mills Dock with a view of determining the elevati of one of the main tide gauges established at this point.

12. *Tidal data.*—In order to determine the mean low water plane in Back River, a series of simultaneous high and low water readings covering 16 consecutive days, w made at Cypress Mills Dock and on a gauge set at the foot of Gloucester Street, E River, in Brunswick Harbor. All high and low waters were read from October 2 November 6, and have been tabulated with the following general conclusions:

13. The mean of 30 high water readings on the East River gauge for the period co sidered was 7.86 feet; the mean of 30 low water readings on the same gauge was 0.4 foot, giving a mean rise and fall in East River for the 16 days' observation of 7.39 fe which is 104 8 per cent of the mean rise and fall in East River, namely 7.05 feet. Th mean of 31 high water readings on the Cypress Mills gauge (the zero of which had bee set at the elevation of mean low water in Brunswick Harbor) was 7.64 feet, and th mean of 30 low water readings is 0.70 foot for the period of 16 days, giving a mean ri and fall of 6.94 feet. Assuming that this rise and fall was 104.8 per cent of the mea rise and fall, gives 6.62 feet as the mean rise and fall in Back River at Cypress Mill a difference of 0.44 foot between the rise and fall of Brunswick Harbor and Back Riv The mean low water reading on this gauge set at exactly the same elevation as that i East River, as near as could be determined by line of duplicate levels, shows the lo water to have a slope of 0.23 foot or practically one-half of the difference between th rise and fall, indicating that there is a plus low water slope up Back River, and minus high water slope as high as Cypress Mills.

14. The gauge at Cypress Mills was taken as a standard gauge for all the work. By th lines of levels between St. Simons Island and Brunswick Harbor, it was determin that the low water plane at St. Simons was 0.1 foot above the low water plane in Brun wick Harbor, and in determining the gauges at the mouth of Back River below Cypre Mills it was assumed that there was a plus low water slope from St. Simons Island Back River to Cypress Mills. The above-referred-to observations are given in deta in Tables 1 and 2 for Brunswick Harbor and Cypress Mills, respectively. In Tab No. 3 is given simultaneous comparisons for gauges located at various convenie spots for the sounding work along the river as a whole, and from these comparisons

was determined that the rise and fall at the mouth of the river was 6.5 feet, at the mouth of Terry Creek, 6.6 feet, and at the upper mouth of Little River (where the same leaves Back River) was 6.7 feet.

TABLE No. 1.—*Brunswick Harbor gauge, at foot of Gloucester Street.*

[Zero of gauge set 0.766 feet below mean low water of Brunswick Harbor.]

Date.	High water (a. m.).		Low water (a. m.).		High water (p. m.).		Low water (p. m.).	
	Time.	Gauge.	Time.	Gauge.	Time.	Gauge.	Time.	Gauge.
1912.								
Oct. 22	....	....	10.40	1.83	5.30	8.12	11.15	1.27
23	5.35	8.30	11.30	1.08	6.05	8.03	11.50	.60
24	6.25	8.73	....	....	6.55	8.30	12.15	1.30
25	7.05	8.63	12.45	.79	7.15	8.40	1.05	.92
26	7.45	8.98	1.35	.74	8.10	8.21	1.50	.86
27	8.35	9.17	1.50	.72	9.00	8.32	2.35	1.08
28	9.25	9.38	2.55	.78	9.35	8.24	3.20	1.27
29	9.55	9.10	3.25	.80	10.00	7.80	4.05	1.02
30	10.45	8.82	4.15	1.26	10.30	7.72	4.30	1.42
31	11.30	8.72	4.35	1.27	11.50	7.83	5.15	1.80
Nov. 1	....	....	5.40	1.50	12.20	8.80	6.05	1.76
2	12.50	8.84	6.40	1.05	1.25	8.52	7.40	1.75
3	2.00	8.55	8.35	1.84	3.00	9.02	9.00	1.78
4	3.25	9.00	9.35	1.85	4.05	8.90	10.00	1.73
5	4.40	9.02	10.55	1.25	5.00	9.03	11.25	1.05
6	5.35	9.26	11.55	.82	5.55	9.05	....	....
		124.50		17.58		134.29		19.61

Sum of 30 high-water readings=258.79, mean, 8.626−0.766=7.860; sum of 30 low-water readings=37.19, mean, 1.239−0.766=0.474; mean rise and fall, 7.386.

TABLE No. 2.—*Cypress Mills gauge.*

[Zero of gauge set at elevation of mean low water, in East River, Brunswick Harbor, by level line.]

Date.	High water (a. m.).		Low water (a. m.).		High water (p. m.).		Low water (p. m.).	
	Time.	Gauge.	Time.	Gauge.	Time.	Gauge.	Time.	Gauge.
1912.								
Oct. 22	5.00	7.20	10.20	1.30	5.30	7.20	11.45	0.80
23	5.45	7.40	11.35	.60	6.45	7.10	11.40	.00
24	6.30	7.90	....	....	6.50	7.40	12.15	.90
25	7.20	7.70	12.35	.20	7.30	7.50	1.10	.50
26	8.00	8.10	1.25	.00	8.05	7.30	1.50	.40
27	8.30	8.30	2.15	.00	8.40	7.50	2.40	.70
28	9.30	8.60	2.45	.60	9.20	7.30	2.55	.80
29	9.55	8.20	3.10	.40	9.45	6.90	3.55	.60
30	10.40	7.90	3.20	.30	10.30	6.75	4.40	.80
31	11.30	7.88	4.20	.78	11.50	6.82	5.20	.25
Nov. 1	....	....	5.40	.90	12.40	7.98	6.30	1.40
2	1.05	6.40	7.10	.37	1.40	7.84	7.50	1.48
3	2.30	7.20	8.30	1.32	2.50	8.17	9.00	1.30
4	3.50	7.65	9.30	1.30	4.00	8.00	10.20	1.10
5	5.00	8.10	10.40	.80	5.10	8.15	11.10	.55
6	5.50	8.42	11.30	.50	6.00	8.00	....	....
		116.95		9.37		119.91		11.58

Sum of 31 high-water readings=236.86—mean=7.64; sum of 30 low-water readings=20.95—mean=0.700; mean rise and fall=6.94.

Table No. 3.—*Simultaneous gauge readings, Terry Creek and Back River.*

Name of gauge.	Oct. 29, 1912.			Nov. 9, 1912.			Nov. 12, 1912.		
	Time.	Gauge reading.	Corrected reading.	Time.	Gauge reading.	Corrected reading.	Time.	Gauge reading.	Corrected reading.
Black River gauge. Gauge is 0.10 foot too low. Subtract. Elevation of local mean low water is 0.15 foot above Brunswick datum. Rise and fall—6.50.	3.50 p. m.	0.53	0.43	....	....	....	9.40 a. m.. 3.55 p. m..	6.62 —.30	6.52 —.40
Terry Creek gauge. Gauge is 0.075 foot too low. Subtract 0.75. Rise and fall, 6.60. Elevation of local mean low water is 0.2 foot above Brunswick datum.	3.55 p. m.	1.14	.39	....	....	....	9.40 a. m.. 4.30 p. m..	7.45 .38	6.70 —.37
Cypress mill gauge. Gauge is 0.23 foot too low. Subtract 0.23. Elevation of local mean low water is 0.23 foot above Brunswick datum. Rise and fall, 6.62.	3.55 p. m.	.58	.35	2.45 p. m..	— .55	— .78	9.45 a. m.. 4.05 p. m..	6.92 — .20	6.69 — .43
Little River gauge. Gauge is 0.45 foot too high. Add 0.45. Rise and fall, 6.70. Elevation of local mean low water is 0.27 foot above Brunswick datum.	....	....	....	2.20 p. m..	—1.20	— .75	9.55 p. m.. 4.10 p. m..	6.35 — .81	6.80 — .35

Referred to low-water plane, mouth of Terry Creek. Oyster factory gauge set 1.24 feet too high. Add. No. 2 gauge set 1.05 feet too high. Add.

15. The gauges on Terry Creek were all set with their zero corrected to the elevation of mean low water at the mouth of Terry Creek, with the idea that should the improvement contemplated be made that the tidal condition would then be changed from what it is at present and would approach that existing at the mouth of the creek, due to the considerable enlargement of the cross section of the upper portion of the creek.

16. *Map.*—The field work has been platted in the form of working drawings to a scale of 1:4000, covering all work. In addition to this, a working map of Terry Creek has been platted to a scale of 1:2000, because of the fact that the main improvement contemplated will be along this waterway, and it was thought that the scale of 1:4000 would hardly be adequate for making a proper estimate for this work. In the way of final maps, the survey as a whole has been placed upon one sheet to a scale of 1:10000, which shows also an index map giving the general location of the improvement. This map shows only picked soundings for a general delineation of the hydrographic character of the waterways, also the axis of the proposed improvement with all topographical features obtained, but does not show the location and description of borings, which latter information is only shown upon the field or working drawings. In addition to the map there is also submitted, as sheet No. 2, a finished tracing to a scale of 1:2000 of the working drawing. Upon this sheet all information available is delineated with an axis of the proposed cuts for improvement of the same.

OBSTRUCTIONS.

17. *Artificial.*—No artificial obstructions exist across either of these waterways.

18. *Natural.*—The natural obstructions to the use of the waterways, so far as the navigable depths at present exist, consist only of the shoals outlined in a general description of the waterways. No snags nor overhanging trees are encountered.

COMMERCE, PAST, PRESENT, AND PROSPECTIVE.

19. The commerce on Terry Creek and Back River is so closely allied, in that whatever goes over Terry Creek must naturally also go over at least a portion of Back River it is difficult to separate the same; however, in order to show wherein the commerce originates, they are shown separately.

20. *Terry Creek.*—Commerce for this waterway is shown in tabulated form, and is compiled from records on file in this office and information submitted by the various shippers now using the same. No attempt has been made to estimate what the future commerce over either of these waterways would amount to outside of the expansion that is now involved in the plans of those now making use of the same. Statements covering this data may be found in the letters attached as an appendix to this report.

Name of shipper.	Past or present commerce.			Prospective commerce.		
	Commodity.	Tons.	Value.	Commodity.	Tons.	Value.
Glynn Canning Co.	Oysters	6,150	$26,500	Canned products	15,000	$60,000
	Shells	4,200	4,400			
Georgia Veneer & Package Co.	Logs	10,000	50,000	Logs, lumber	40,000	200,000
	Lumber	1,000	6,000	Finished product	1,200	120,000
Yaryan Naval Stores Co.	Raw material	54,000	144,000	Raw material, inbound.	126,000	360,000
	Finished product	14,400	720,000	Finished, outbound.	90,000	5,400,000
Total		89,750	950,900		272,200	6,140,000

21. *Back River.*—The past and present commerce of this waterway consists almost entirely of shipments of lumber from the Cypress Mill Dock and the Taylor-Cook Lumber Co. docks. From the former docks during the last fiscal year there was shipped 12,000,000 feet of sawn lumber, valued at $250,000. The Taylor-Cook Lumber Co. has not operated its mill for the past three years, but have a capacity of 50,000 feet per day, or 18,000,000 feet per annum. The major portion of the lumber is brought as raw material to the mills in the shape of rafts from the adjacent waterways from the Altamaha River to the northward and Satilla River to the southward.

22. *Back River, prospective.*—In the way of prospective commerce for this waterway, from letters received from the Hilton & Dodge Lumber Co., it is evidently their intention to further enlarge the Cypress Mills so as to produce shipments of 18,000,000 feet annually from their docks, valued at $400,000. In addition to the above the prospective commerce that is contemplated to be carried through Terry Creek will, to a large extent, be carried over Back River, though the present depth existing in this portion of the river is ample for transporting the raw material that will be carried up Terry Creek.

23. As an indication of the extent of the development in manufactures making use of the raw materials, in the shape of wood, attention is directed to the description of these plants with the values of their investments as given in the preliminary report submitted on this waterway under date of August 30, 1912.

24. Consideration must be given to the actual and present use of these streams and the prospective development of these and other industries; also in view of the fact that the raw materials for these factories come from a large portion of southeast Georgia, especially that portion adjacent to the numerous waterways leading to this port (two of these concerns have large holdings on the following waterways: St. Marys River, Satilla River, Little Satilla River, Upper Turtle River, and the Altamaha River system). Consequently any improvement that will allow the extension of this class of business will be a material development of the whole of southeast Georgia.

25. In addition to the above, any movement which will foster a development of the great natural resources in wood pulp along the waterways of southeast Georgia must be considered a widespread benefit.

TERMINAL AND TRANSFER FACILITIES.

26. At present on Back River there exist two loading points, one of which is in good condition and in constant use, namely, that of the Cypress Mills, the lumber for this dock being transported by means of tramway from the mill located on the highlands out to a wharf on deep water in Back River.

27. On Terry Creek there is at present one loading wharf for the transfer of oysters in the shell, the finished product of which is transported mostly by rail. At the Georgia Veneer & Packing Co. a landing place with logways and booms has been constructed for the care of such raw material as is received and for the loading of lighters for water shipments. At the Yaryan Naval Stores plant there has been constructed a loading basin or slip some 500 feet in length, with a wharf for the transfer of finished products and a log tramway for taking care of timber brought to this plant in the form of rafts for the use of their barrel factory.

28. The land just south of the Yaryan plant's frontage is now vacant, and will be acquired by the city under a grant from the State for the purpose of holding; frontage upon Terry Creek 1,000 feet in length will be set aside to be improved, held, and operated as municipal docks for the benefit of the public, without discrimination, and afford ample facilities for vessels desiring to use the same, should the proposed improvement be accomplished. By the above existing transfer facilities and the contemplated extensions by the city the necessary transfer facilities can be met immediately, and any necessary extensions for the future commerce over this waterway. Illustrative of these existing facilities and the interested plants there is submitted along with this report a set of photographs, in duplicate, with attached descriptions to the same.

29. *Water power.*—Owing to the character of this waterway (a tidal estuary), the question of water power will not be considered.

30. *Estimates, Back River.*—The improvement of Back River so as to have an available depth of 17 feet at mean low water as far up as the Taylor-Cook docks necessitates the removal of approximately 185,000 cubic yards of material in order to obtain a channel 150 feet in width with proper side slopes.

31. The shoals are located, the first between the mouth of Terry Creek and the mouth of Mill Creek, 3,000 feet in length, and the second between the two docks, 3,800 feet in length. The cost of this work would be in the neighborhood of $40,000. In order to obtain a depth at the upper portion of Back River suitable for tugboats towing timber at all stages of the tide it would be necessary to dredge through two shoals approximately 1,200 and 600 feet, respectively, necessitating the removal of about 22,000 cubic yards of material at a cost of $4,500. The following table gives the length and yardage for each of these shoals:

BACK RIVER.

Locality.	Length.	Bottom width of cut.	Yardage.	Material.
For 17-foot depth (side slopes 1 on 3):	*Feet.*	*Feet.*		
First shoal (Terry Creek, Mill Creek)	3,000	150	85,000	Soft mud and shell.
Second shoal	3,800	150	100,000	Do.
	6,800	....	185,000	
For 7-foot depth (side slopes 1 on 3):				
Third shoal	1,200	150	15,000	Stiff mud.
Fourth shoal	600	150	7,000	Mud and shell.
	1,800	....	22,000	

32. *Terry Creek.*—In order to obtain a navigable channel 17 feet deep at low water suitable for seagoing vessels it is necessary to dredge through three shoals and widen the natural channel at one point and straighten the upper portion of this waterway. The total length of cutting is approximately 11,000 feet, and the total yardage necessary to remove to accomplish the above channel approximately 580,000 cubic yards, including yardage in 1 foot overdepth. This material is mostly marsh mud and sand, though apparently the shoal at the mouth has some hard clay within the limits to be dredged.

33. All of this material can be removed by either the ordinary type of bucket dredge or hydraulic suction dredge. It is estimated that the cost of the removal of this material will not exceed 20 cents per yard, which will make a total cost of Terry Creek proper of $116,000 for the removal of the material, plus 10 per cent for contingencies, making a total of $127,000. The locality at which dredging will be necessary is indicated on the map submitted herewith under letters A to E, and the correspond-

ing letters are shown in the accompanying detail, with lengths and width of cutting at each locality, yardage, and material:

Terry Creek.

[17-foot depth; side slopes 1 on 3.]

Index letters.	Locality.	Length of cutting, in feet.	Bottom width of cut, in feet.	Yardage.	Material.
A	Mouth	2,000	100	65,000	Clay and sand.
B	First bend	1,440	100	51,000	Marsh mud.
C	Second shoal	1,560	100	38,000	Marsh and sand.
[1] D	Third shoal and turning basin	1,885	100	56,000	Mud and sand.
E	Straightening and deepening	4,090	100	370,000	Mud, shell, and sand.
		10,975	....	580,000	

[1] Turning basin 500 by 500 feet formed by creek and improved channel.

SUMMARY OF ESTIMATES.

	Cubic yards.	Cost.
Back River, improvement to 17 feet (not recommended to be done at the present time)	185,000	$40,000
Back River, improvement to 7 feet	22,000	5,000
Terry Creek, improvement to 17 feet	580,000	127,000
Total	602,000	[1] 132,000

[1] Includes cost of dredging and 10 per cent for contingencies.

34. *Improvement recommended.*—In making a recommendation for improvement of these two streams it is deemed expedient to consider the improvement of Back River separate from the improvement of Terry Creek.

35. *Back River.*—At present there exists such depths in Back River, below the docks now shipping lumber in coastwise vessels, sufficient to allow the use of vessels drawing 16 to 17 feet, at high water, the coming and going of which are not materially interfered with by the necessity of awaiting a high-water stage. As the rise and fall of this part of the river is close to 7 feet, these controlling depths are sufficient for the present and prospective commerce on this part of the waterway. So far as the transportation of raw material to the new developments on Terry Creek is concerned, the depth is ample, except those across the shoals at the upper end of Back River, where it would be advantageous to have same increased to that existing along the inside waterway, namely, 7 feet at mean low water.

36. *Terry Creek.*—The development of the eastern portion of Brunswick in such a manner as to increase her shipping facilities calls for a depth sufficient to take care of seagoing vessels of both sail and steam type, and a depth of 17 feet of low water has been requested by shippers. In order to make Terry Creek navigable for seagoing vessels, it will be necessary, in addition to a depth of 17 feet at low water, to make such enlargement of its cross section and easement on the bends as will make practical the handling of ships up to 300 feet in length, and the channel as outlined on the map has been laid out, and the estimate given above is along the lines the axes of which are shown upon this chart.

37. The western frontage of Brunswick Harbor is to a great extent taken up already by corporations and railroads and allows no room for the development of manufactures needing extensive cheap sites, such as are now being located upon the eastern side of Brunswick Peninsula.

38. In consideration of the above, and the present commerce and prospective commerce that is dependent upon the improvement of Terry Creek, and in view of the bearing of this class of commerce upon the creation of markets for the class of raw material abundant over southeast Georgia, it is recommended that the same be improved to a depth of 17 feet at mean low water, enlarged and straightened so as to accommodate seagoing vessels with drafts approximately 22 feet. In addition to the above it is also recommended that the shoal in Back River at its junction with Mackays River in the vicintiy of False Point be improved to a depth of 7 feet.

W. C. Lemen.

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1396.

MAHONING RIVER, OHIO.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF MAHONING RIVER, OHIO, WITH A VIEW TO SNAGGING THAT PORTION BETWEEN WARREN AND LEAVITTSBURG, AND 5 MILES FARTHER TOWARD ITS SOURCE.

FEBRUARY 14, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, February 13, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 11th instant, together with copy of a report from Lieut. Col. Francis R. Shunk, Corps of Engineers, dated December 18, 1912, on preliminary examination of Mahoning River, Ohio, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 11, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Mahoning River, Ohio.

1. There is submitted herewith, for transmission to Congress, report dated December 18, 1912, by Lieut. Col. Francis R. Shunk, Corps of Engineers, on preliminary examination of Mahoning River, Ohio, with a view to snagging that portion between Warren and Leav-

ittsburg and 5 miles farther toward its source, called for by the river and harbor act approved July 25, 1912.

2. The Mahoning River unites with the Shenango to form the Beaver River, a tributary of the Ohio River, into which it empties at Beaver, Pa., about 25 miles below Pittsburgh. Neither the Beaver, the Mahoning, nor the Shenango is navigable except for short distances on isolated pools formed by power dams, where light-draft boats may be operated. The city of Warren is situated on the Mahoning River, approximately 37.3 miles above its junction with the Shenango. The stretch under consideration from Warren to a point 5 miles above Leavittsburg has a total length of 13 miles. The width of the stream in this portion averages about 175 feet and the depths during the greater part of the year are less than 1½ feet and frequently not more than 3 inches on the bars. Three power dams obstruct this section.

3. No use is made of the river for transportation of freight at the present time, and the district officer states that there is no evidence of a demand for the movement of commodities by water, navigation being confined to a limited number of small launches and canoes on some of the artificial pools created by water-power dams. In the stretch mentioned in the act are a number of snags and obstructive bowlders, the removal of which is desired to facilitate the navigation of these small pleasure craft. Since there is no present commerce on the river and no prospect of any should the snags be removed, the district officer expresses the opinion that the locality is not worthy of improvement by the United States. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 21, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Mahoning River, Ohio, with a view to snagging that portion between Warren and Leavittsburg and 5 miles farther toward its source, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 21, 1913.

To the Chief of Engineers, United States Army:

1. The Mahoning River unites with the Shenango to form the Beaver River, which empties into the Ohio 25 miles below Pittsburgh. The city of Warren is located on the Mahoning River 37.3 miles above its junction with the Shenango.

2. The Geological Survey reports the maximum discharge recorded in 1906 was 12,500 cubic feet per second and the minimum 113 cubic feet per second, at a point 20 miles below Warren. At Girard on July 13, 1909, the discharge was estimated not to exceed 75 cubic feet per second, and observations made in 1895 indicated that it may at times fall below 20 feet per second.

3. That portion of the river included in the present examination has a total length of 13 miles, is obstructed by three water-power dams, and navigation is confined to the several pools. There is no movement of freight on the river, navigation being limited to the use of small motor boats and canoes for pleasure purposes. The district officer is of opinion that this river is not worthy of improvement by the United States, in which view the division engineer concurs.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. This is an isolated section of a small river having no navigable connection with any other waterway above or below. It is used for pleasure purposes, and there is no apparent demand for its use in the interests of commerce and general navigation. The board therefore concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the General Government to undertake the improvement of Mahoning River, Ohio, with a view to snagging that portion between Warren and Leavittsburg and 5 miles farther toward its source.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF MAHONING RIVER, OHIO.

War Department,
United States Engineer Office,
Pittsburgh, Pa., December 18, 1912.

From: Lieut. Col. Francis R. Shunk, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Mahoning River, Ohio.

1. This report is submitted in compliance with letter of the Chief of Engineers, dated August 3, 1912, and under the provision of the following item of the river and harbor act approved July 25, 1912: Mahoning River, Ohio, with a view to snagging that portion between Warren and Leavittsburg and 5 miles farther toward its source.

2. There has been one previous examination of this river made in 1909 under the provisions of the river and harbor act of March 3 of that year, covering a portion of the river from the dam at Girard up to Warren. Report was published as House Document No. 211,

Sixty-first Congress, second session. It was recommended that the locality was not worthy of improvement by the General Government.

3. The present examination was made by Mr. J. W. Arras, assistant engineer, assisted by Mr. J. C. Getty, inspector, October 31, 1912. It included a reconnoissance covering the entire distance by boat, and the information thus secured has been plotted on a sketch map [1] accompanying this report, which shows the locations of dams, bridges, bars, snags, and ripples, and gives elevations, flood depths of water, and other useful information. Persons interested in the improvement were also interviewed and their views obtained.

4. The Mahoning River unites with the Shenango to form the Beaver River, which is 20.4 miles long and empties into the Ohio River at Beaver, Pa., about 25 miles below Pittsburgh. The city of Warren, Ohio, is located on the Mahoning River, approximately 37.3 miles above its junction with the Shenango. Neither the Beaver, the Mahoning, nor the Shenango River is navigable except for short distances on isolated pools formed by power dams, where light-draft boats may be operated. The downstream limit of the city of Warren is about 6 miles above the head of the pool of the Girard Dam, which pool is approximately 6½ miles in length. The elevation of the Mahoning River at the downstream limit of Warren is approximately 186 feet above the level of pool 6 in the Ohio River, into which the Beaver flows. The average width of the Mahoning below Warren is about 200 feet. The estimated watershed above Warren is 620 square miles. According to discharge measurements made by the United States Geological Survey the maximum discharge recorded for 1906 was 12,500 cubic feet per second and the minimum discharge 113 cubic feet per second, at a gauging station maintained 20 miles below Warren. At Girard Dam on July 13, 1909, the discharge was estimated not to exceed 75 cubic feet per second, and observations made in 1895 indicated that it may at times fall below 20 cubic feet per second.

5. There are many large manufacturing and industrial establishments in the Mahoning and Shenango Valleys, of which the chief centers are Niles, Girard, Youngstown, and Struthers on the Mahoning, and New Castle and Sharon on the Shenango. Three main trunk-line railroads cross the Mahoning Valley, viz, the Erie, the Baltimore & Ohio, and Pennsylvania Railroads.

6. That portion of the river included in the present examination from Warren to a point 5 miles above Leavittsburg has a total length of 13 miles. The width of the stream in this portion varies from 100 feet to about 300 feet, average width being 175 feet. The banks vary in height above the low-water level from 3 to 25 feet. They are, as a rule, firm, being almost perpendicular, and show little indication of erosion. Except in the cities and towns the banks are well protected with trees and bushes. Generally the river bed is hard, much of it rock, and there is but a limited movement of heavy silt. The total fall over the distance covered by the examination is approximately 26.5 feet, or an average of a little over 2 feet per mile. There are many obstructive bars, varying in height up to 8 feet above low water and in places extending almost across the stream. These are usually covered with a substantial growth of willows and other bushes. Snags

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[1] Not printed.

abound in the pools formed by power dams, but otherwise the stream is comparatively free from snags or obstructive bowlders.

7. During the greater part of the year a comparatively low stage of water prevails, with depths of less than 1½ feet and frequently not more than 3 inches, on the bars. With occasional rainy intervals, which are likely to occur at any season of the year, this low-water period may be said to extend from the latter part of May until February or March. However, during this season rains do occur more or less frequently, sometimes continuing for as much as two or three weeks, and causing the water to fluctuate between a depth of 1½ feet and 5 or 6 feet in the shallowest places. After the general melting of the snows at the close of winter, usually about the beginning of March, and extending over until May, a medium stage of water varying in its minimum depth from 2 to 6 feet is likely to prevail. Extreme freshets occasionally accompanying the breaking of the winter's ice and melting of the snows are said to reach a height of 11 to 12 feet above ordinary low water. These usually subside at the end of one or at most two days. The water at its higher stages overflows the low banks up to depths of 5 to 8 feet. However, as a rule, the low bottom lands subject to overflow are used only for agricultural purposes.

8. The city of Warren has a population of about 13,000. It has a few important and several small manufactories, and the Trumbull Steel Co. is now building a factory which will probably employ more than 1,000 persons. The city is also the distributing center for a large agricultural territory. Leavittsburg, 8 miles farther up the stream, is a very small town, the population being about 50. That part of the valley covered by the examination is devoted chiefly to agriculture. Supplies are obtained in the early spring and crops marketed in the late summer and autumn.

9. Since the abandonment, about 1870, of the Ohio & Pennsylvania Canal, which crossed the Mahoning River at Warren, no use has been made of the river for transportation of freight. Nor is there to-day any evidence of a demand for the commercial movement of commodities by water on any portion of the stream. The navigable use of the Mahoning at present is confined to the operation of a limited number of small launches and canoes on some of the artificial pools created by water-power dams.

10. On the reach of river under discussion there exist three water-power dams and the remains of an abandoned milldam at Leavittsburg. Two of these are at Warren, one being located 1.1 miles above the downstream city limit and the other 1½ miles farther up. The lowermost dam is 275 feet long and 6 feet high and is built of timber. It is used by the Warren City Flour Mill for power purposes, being supplemented by a steam plant for use during the lower stages of the river. The dam next above is 265 feet long and 5.1 feet high above low water. It is also a timber structure, owned by the Trumbull Public Service Co., and used for generating electricity for commercial purposes. Its power is not depended upon to any considerable extent by the service company, which relies chiefly on a steam plant for its power at this locality. The third dam is located at Leavittsburg and is a modern reenforced concrete structure 185 feet long with a lift of 7.4 feet above low water. It also belongs to the Trumbull Public Service Co. and its power is used for generating

electricity whenever the water supply is sufficient. It is not supplemented by steam or other power. The abandoned timber milldam is located about 300 feet above the Leavittsburg concrete dam, which was built to replace it.

11. The Leavittsburg Dam forms a pool the extreme length of which is approximately 11 miles. It furnishes a sufficient depth of water for small launches for a distance of 8 miles. The pool formed by the upper dam at Warren is 1½ miles in length, extending about one-half mile above the upstream limit of the city. The pool at the lower dam at Warren extends up to the upper dam and furnishes a depth of from 4 to 6½ feet at low water, except for a short distance below the upper dam.

12. No terminal facilities for navigation purposes are provided. However, it is probable that these could be had should they at any time be required.

13. Crossing this portion of river there are 14 bridges, 9 of which are highway structures and 5 railroad bridges. Their locations, spans, and clearance heights above low water are given in the following table:

Bridges over Mahoning River, Warren, to 5 miles above Leavittsburg, Ohio.

Name.	Distance above South Main Street Bridge, Warren.	Kind.	Number of spans.	Clear height above pool or low water.	Width of main span between center of piers.	Total width between abutments.
	Miles.					
Warren, South Main Street.	0.00	Through truss and plate girder, highway.	3	[1] 17.6	98.5	262.5
Baltimore & Ohio R. R.	.55	Decked plate girder	3	[2] 10.2	78.0	226.5
Erie R. R. (Cleveland line)	.58	do	3	[2] 14.5	69.5	202.5
Highway	.59	Plate girder	3	[2] 13.3	69.5	202.5
Market Street, highway	.80	Iron through truss	1	[2] 12.9	....	203.0
Highway	1.70	do	2	[2] 16.2	147.7	271.0
Erie R. R. (Chicago line)	1.80	Decked plate girder	4	[2] 19.5	86.0	273.0
Highway	5.60	Iron through truss	1	[1] 17.5	....	173.0
Leavittsburg, highway	7.70	do	1	[1] 19.0	....	145.5
Clingensmith, highway	9.50	do	1	[2] 13.0	....	128.0
"Diehl," highway	9.40	Covered wooden through truss.	1	[2] 13.5	....	130.0
Erie R. R. (Cleveland)	11.20	Iron through truss, double track.	1	[2] 14.2	....	153.5
Erie R. R. (Chicago line)	11.60	do	1	[2] 15.3	....	183.0
Highway	12.40	Covered wooden through truss.	1	[2] 14.5	....	103.0

[1] Low water.

[2] Pool.

14. As set forth in the river and harbor act, the purpose of this examination is to determine the worthiness of the portion of river in question for the removal of its snags. As has been stated there are no commercial movements of commodities on the Mahoning River. There are, however, about 16 motor boats, varying in length from 18 to 20 feet and having a maximum draft of 22 inches, and about 62 canoes, operating mainly in the various artificial pools, and more particularly in the pool formed by the Leavittsburg Dam, which furnishes much the longest navigable reach. In these pools there were found 40 snags or leaning trees and a small number of obstructive bowlders, but it is probable, and information gained from neighboring sources indicates, that the total number of obstructive snags, etc., visible and submerged will amount to 100.

15. The principal object of those interested in the improvement of the river is the removal of these snags in order that pleasure boats may be operated with comparative safety at all stages of the water. A second object of the interested persons, who are mostly residents of Warren, is that the river may be freed from obstructive bars, especially in the vicinity of lower Warren, which, during the breaking up of ice, cause huge gorges to form whereby the lower portion of the city is almost annually innundated to a depth of 2 to 5 feet.

16. While in a sense requests of this nature will readily be admitted as worthy of serious consideration in the best interests of certain localities, nevertheless it would appear that the present interpretation of the Government's policy as applied to improvement of its internal waterways will exclude them from consideration where they apply to streams of no present or prospective commerce. Since there is no present commerce on the Mahoning River and no prospect of any should the snags in question be removed, I am constrained to report that in my opinion this river is not worthy of improvement by the United States.

FRANCIS R. SHUNK.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
December 26, 1912.

TO CHIEF OF ENGINEERS:

I concur in the views of the district officer.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors, see p. 2.]

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1397.

ST. JOHNS RIVER, FLA., FROM LAKE HARNEY TO LAKE WASHINGTON.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF ST. JOHNS RIVER, FLA., FROM OUTLET OF LAKE HARNEY TO LAKE WASHINGTON, INCLUDING REMOVAL OF BARS IN LAKES HARNEY AND PUZZLE.

FEBRUARY 14, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 13, 1913.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 12th instant, together with copy of a report from Capt. J. R. Slattery, Corps of Engineers, dated December 18, 1912, with map, on preliminary examination of St. Johns River, Fla., from outlet of Lake Harney to Lake Washington, including removal of bars in Lakes Harney and Puzzle, made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 12, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of St. Johns River, Fla.

1. There is submitted herewith, for transmission to Congress, report dated December 18, 1912, with map, by Capt. J. R. Slattery, Corps of Engineers, on preliminary examination of St. Johns River, Fla., from

outlet of Lake Harney to Lake Washington, including removal of bars in Lakes Harney and Puzzle, called for by the river and harbor act approved July 25, 1912.

2. St. Johns River has its source in Halpatiokee Swamps, which lie south of Saw Grass Lake and northeast of Lake Okechobee. It flows northerly to Jacksonville, from which point the flow takes an easterly direction until it empties into the Atlantic Ocean at Mayport, Fla. The river has a channel depth of at least 5 feet south of Lake Harney.

3. The length of this portion of St. Johns River is 69 miles. Depths of considerably more than 6 feet are available in Lake Harney, except at the bar at the south end of the lake, which has only 2 feet of water over it at low stage, and there are three other bars between Lake Harney and Lake Clement with a similar depth. Between Lake Clement and Lake Poinsett the limiting depth is 3 feet; in Lake Poinsett 6 feet is available, except on a bar at its southern end with only 4 feet of water over it; thence through Lake Winder to within a short distance of Lake Washington 7 feet is available; and from this point to and through Lake Washington a depth of 4 feet is available. The banks of the river are low and in many places undefined, the river merely spreading out through the swamps.

4. This river is under improvement by the General Government up to Lake Harney, to which point the adopted project provides for securing a channel 5 feet deep and 100 feet wide. The section between Lake Harney and Lake Washington is not used for navigation purposes to any extent at the present time, and it appears from the report of the district officer that there is little or no present or reasonably prospective demand for river transportation. He therefore expresses the opinion, in which the division engineer concurs, that the locality is not worthy of improvement by the United States at the present time.

5. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 21, 1913, concurring with the views of the district officer and the division engineer.

6. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of St. Johns River, Fla., from outlet of Lake Harney to Lake Washington, including removal of bars in Lakes Harney and Puzzle, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 21, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The distance from the outlet of Lake Harney to Lake Washington is 69 miles. The depths in Lake Harney are 6 feet and over except on the bar at the south end, where the depth is 2 feet. Between Lake Harney and Lake Clement the limiting depth is 2 feet; between Lake Clement and Lake Poinsett, 3 feet; in Lake Poinsett, 6 feet; on the bar at the southern end, 4 feet; through Lake Winder, 7 feet to within a short distance of Lake Washington, where the depth is 4 feet, which depth is available in the lake.

2. The district officer states that this portion of the St. Johns River is not used for navigation purposes to any extent at the present time. The banks of the stream are low and in many places undefined, the river merely spreading out through the swamps. He states that efforts to ascertain the needs of improvement indicated that there is now no commerce whatever on this part of the river, and that there is no demand for its improvement. He reports the locality as unworthy of improvement, in which view the division engineer concurs.

3. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

4. The St. Johns River is under improvement up to Lake Harney. The reach under consideration is composed of a number of lakes and tortuous connecting channels, much of the country being low-lying and swampy. It has no commerce at present and there is nothing to indicate any development in the immediate future. The board concurs in the views of the district officer and the division engineer and reports that in its opinion it is not advisable for the United States to undertake the improvement of St. Johns River from the outlet of Lake Harney to Lake Washington.

5. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF ST. JOHNS RIVER, FLA., FROM OUTLET OF LAKE HARNEY TO LAKE WASHINGTON.

War Department,
United States Engineer Office,
Jacksonville, Fla., December 18, 1912.

From: Capt. J. R. Slattery, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of St. Johns River, Fla., from outlet of Lake Harney to Lake Washington.

1. In compliance with department letter, dated August 3, 1912, I submit the following report on the preliminary examination of the St. Johns River from outlet of Lake Harney to Lake Washington, authorized by the river and harbor act approved July 25, 1912.

2. The length of this portion of St. Johns River is 69 miles. The course of the river is shown by accompanying tracing, which has been prepared from survey made by Mr. P. B. Bird, under the direction of Maj. (now Lieut. Col.) Francis R. Shunk, in 1904. The depths are shown by a longitudinal profile of the river prepared in connection with the above survey. Although this survey was prepared 8 years ago it still gives a very much better idea of this portion of the river than a reconnoissance survey would, and the maps based on the former survey are therefore used in lieu of reconnoissance maps. The elevation of Lake Washington at low-water stage is about 14 feet above mean sea level, and the elevation of Lake Harney about 4.67. Most of this fall takes place between Lake Poinsett and Lake Harney, and the fall is very uniformly distributed. There is only a fraction of a foot's difference between the elevation of Lakes Washington and Poinsett.

3. Depths of considerably over 6 feet are available in Lake Harney, except for bar at the south end of the lake with only 2 feet of water over it at low stage, and there are three other bars between Lake Harney and Lake Clement, with only this depth of water over them. There are 13 bars in the stretch with less than 3 feet of water over them, 32 with less than 4 feet, and 55 with less than 5 feet. In order to obtain a 6-foot channel it is estimated that dredging averaging about 2 feet in depth would have to be done for about half the length of this reach.

4. Between Lake Clement and Lake Poinsett there are limiting depths of 3 feet. In this reach there are 6 short shoals with less than 4 feet over them, 20 with less than 5, and 45 with less than 6.

5. In Lake Poinsett a depth of 6 feet is available, but there is a bar at the southern end with only 4 feet of water over it. South of this bar 7 feet is available through Lake Winder to within a short distance of Lake Washington, where the depth shoals to 4 feet. Only this depth of water is available in Lake Washington.

6. Low water prevails in the St. Johns River during March and April, high water during September and October, and intermediate stages between these periods. There is a difference of about 4 feet between high and low water stages. The highest known stage was about 6 feet higher than the low water indicated by map and the lowest low water about 1.5 foot lower. The orange crop is brought out of the river in December, January, and February. Vegetable ship-

ments continue during March and April. Fertilizer is carried principally during the months of June and November. This particular stretch of the river, however, is not used for navigation purposes to any extent at the present time. It flows through low swampy land. The banks are generally not more than a foot above low-water level. There are a few places where banks 5 or 6 feet above low water occur on one side or the other, and there are many places where even at low water there is no bank whatever, the river merely spreading out through the swamps.

7. The river proper varies in width from 50 feet to 125 feet.

8. No previous examinations and surveys have been made of this portion of the St. Johns with a view to its improvement. The survey from which maps accompanying this report were prepared was made with a view to determining what effect the lowering of Lake Washington would have on the river.

9. An effort has been made to find what was desired in the way of improvement in this portion of the river. The Hon. Frank Clark, in whose district it lies, was requested to furnish the names of parties interested in this matter, and letters were sent to those named by him. Replies were received from Messrs. Woodruff and Whitner, and copies[1] are attached hereto. From these it is seen that there is apparently no commerce whatsoever on this part of the St. Johns River and that there is no demand for its improvement.

10. There are no terminal facilities in this portion of the river. The land bordering the river would be valuable if drained, but the most logical way to drain this land would be to lower the surfaces of the lakes through which the river flows by canals dug to the coast, and then also lower the surface of the water in the river proper. Such drainage operations would not only injure this part of the river, but might also injure the lower river, which is used to a considerable extent by navigation. It is greatly doubted whether any scheme for drainage could be coordinated with one in the interests of navigation. The character of the country is such as to render the development of water power impossible.

11. The St. Johns River between Lakes Harney and Washington is not worthy of improvement by the United States at the present time.

12. Notice of adverse report has been sent to the persons whose names appear on list[1] attached hereto. Copy[1] of notification is also attached.

J. R. SLATTERY.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
January 4, 1913.

To the CHIEF OF ENGINEERS:

I agree with the district officer that this waterway is unworthy of improvement at the present time.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

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[1] Not printed.

O

2D CONGRESS, } HOUSE OF REPRESENTATIVES. { DOCUMENT
3d Session. } { No. 1406.

CHESAPEAKE BAY, OFF POOLES ISLAND, MD.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

ITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF CHESAPEAKE BAY, OFF POOLES ISLAND, MD. ON THE ROUTE BETWEEN BALTIMORE AND PHILADELPHIA, BETWEEN THE SOUTHWEST BAR AND THE NORTHEAST BAR.

EBRUARY 19, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 18, 1913.

he SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the hief of Engineers, United States Army, dated 17th instant, together ith copy of a report from Lieut. Col. L. H. Beach, Corps of Engieers, dated December 12, 1912, on preliminary examination of hesapeake Bay, off Pooles Island, Md., made by him in compliance ith the the provisions of the river and harbor act approved July 5, 1912.

Very respectfully,
HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 17, 1913.

rom: The Chief of Engineers, United States Army.
o: The Secretary of War.
ubject: Preliminary examination of Chesapeake Bay, off Pooles Island. Md.

1. There is submitted herewith, for transmission to Congress, eport dated December 12, 1912, by Lieut. Col. L. H. Beach, Corps f Engineers, on preliminary examination of Chesapeake Bay, off

Pooles Island, Md., on the route between Baltimore and Philadelphia, between the southwest bar and the northeast bar, called for by the river and harbor act approved July 25, 1912.

2. This is a natural channel between shoals in Chesapeake Bay, about 1½ miles northeast of the lighthouse on Pooles Island and 25 miles from the head of the harbor at Baltimore. Some of the interests concerned have stated that aids to navigation are all that are needed, while others desire a straight channel a half mile wide and about 14 feet deep, beginning at the southwest bar and extending to the northeast bar.

3. The district officer states that there is an excellent channel to the eastward of this channel, extending all the way down the bay, which could be followed by any vessel having difficulty in passing through the Pooles Island Channel, and for other reasons fully explained he expresses the opinion, in which the division engineer concurs, that the locality is not worthy of improvement by the General Government at the present time.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 20, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Chesapeake Bay, off Pooles Island, Md., on the route between Baltimore and Philadelphia, between the southwest bar and the northeast bar, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 20, 1913.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. This locality is in the upper part of Chesapeake Bay nearly east of Baltimore City, about 25 miles distant therefrom. The channel through it has a controlling depth of about 20 feet, the rise and fall of the tide being 1.2 feet. This channel is on the route of a large number of vessels passing between Baltimore and Philadephia via the Chesapeake and Delaware Canal.

2. The district officer states that there is a diversity of opinion as to the improvement desired, some indicating that nothing more was needed than aids to navigation, while others desired the straightening of the channel at certain points. It is stated that a number of steamers have gone aground at this locality, entailing loss of time and revenue.

3. There is an excellent alternative channel to the eastward of the Pooles Island Channel, extending all the way down the bay, which could readily be followed by any vessel having difficulty in passing through the Pooles Island Channel. The district officer is of opinion that as there is already a commodious channel available, only 2½ miles longer than the one customarily used, the improvement of this locality is not worthy of being undertaken by the General Government at this time. In this view the division engineer concurs.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity to submit their views to the board, but no communications on this subject have been received.

5. From the facts presented, it appears that at times some difficulty is experienced by the vessels which habitually use the Pooles Island Channel, but that this difficulty could be avoided by adopting the alternative route referred to by the district officer, at a comparatively insignificant loss of time. There does not appear to be any sufficient reason for the improvement of Pooles Island Channel when adequate facilities already exist. The board therefore concurs with the district officer and the division engineer and reports that in its opinion it is not advisable at this time for the General Government to undertake the improvement of Chesapeake Bay, Md., off Pooles Island.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower or other related subjects having any material bearing upon the improvement of navigation at this locality.

For the board.

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF CHESAPEAKE BAY, MD., OFF POOLES ISLAND.

United States Engineer Office,
Baltimore, Md., December 12, 1912.

From: Lieut. Col. Lansing H. Beach, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Chesapeake Bay, Md., off Pooles Island.

1. In compliance with department letter of August 5, 1912, the following report on the preliminary examination of Chesapeake Bay, Md., off Pooles Island, on the route between Baltimore and Philadelphia between the southwest bar and the northeast bar as provided for in the river and harbor act of July 25, 1912, is submitted.

2. This is a natural channel between shoals in Chesapeake Bay, about 1½ miles northeast of the lighthouse on Pooles Island, and 25 miles from the head of the harbor at Baltimore. The controlling depth through it is about 20 feet. The rise and fall of the tide is 1.2 feet.

3. This channel is on the route of the steamboats of the Baltimore & Philadelphia Steamboat Co. between Baltimore and Philadelphia

via the Chesapeake and Delaware Canal. It is also used to some extent by the packets of the Tolchester Steamboat Co., and many tow boats with barges between Baltimore and the Chesapeake and Delaware Canal; also by boats towing stone-laden barges from the Susquehanna River down the bay.

4. The boats of the Baltimore & Philadelphia Steamboat Co. run regularly throughout the year, excepting when prevented by ice. They leave each port at 5 p. m. every evening except Sunday the year around; and from June 15 to September 15 there are two additional boats of about 20 miles per hour speed that make day trips, leaving each port at 8 a. m. These vessels make in all about 800 trips per year and in addition to merchandise, carry about 80,000 passengers. The freight shipments via this line for the last four years are given as follows:

	Tons.
1908	101,294
1909	95,621
1910	97,988
1911	102,015

of general merchandise, including a very large amount of truck, tomatoes, and other perishable freight which requires quick handling. A valuation of this commerce could not be obtained. The Tolchester Co. carried about 13,000 tons of freight valued at about $650,000 and about 75,000 passengers during the last year. The Maryland Transportation Co. states that within the last three years it has towed on decked lighters in the upper bay at least 300,000 tons of crushed stone having an average approximate value of $1.25 per ton at destination, and that this quantity will be greatly increased in the next two years.

5. There is a diversity of opinion between those asking for an improvement of this channel as to what is desired. Some stated that aids to navigation—lights, etc., were all that was needed, while others want a "straight channel a half mile wide and about 14 feet deep, beginning at the southwest bar," marked "S. W. B." on the sketch map accompanying this report, "to the northeast bar," marked "N. E. B." on same map, and still others want both a dredged channel and additional lights.

6. It is stated that the steamers of the Baltimore and Philadelphia line have been ashore many times at Pooles Island, and that it has cost large sums of money and considerable loss of revenue and diversion of trade on account of delay to freight and passengers, which are carried between Baltimore, Philadelphia, Washington, New York, and points north and south at a lower rate than the railroads charge.

7. There is an excellent channel to the eastward of this channel, extending all the way down the bay, which could be followed by any vessels having difficulty in passing through the Pooles Island Channel. The usually traveled course is marked on the map by the line A, B, C, and the proposed new course is shown by the line C, D, E, A. The difference in the length of these lines is about 2½ statute miles, requiring for a 12-mile boat an addition of about 13 minutes to the running time. It is probable however that the speed in the deeper water on the course C, D, E, A would be somewhat greater than in the shoaler water along A, B, C, and that the above difference in running time would be reduced slightly. It appears upon inquiry that

the course via Pooles Island has always been followed by the Baltimore and Philadelphia steamers and no attempt has been made to run by the broader route to the east. One pilot stated that he had run the Pooles Island route for 25 years and had never made a single trip the other way.

8. It does not appear that the desired improvement will have any effect upon freight rates or the amount of commerce.

9. There is no question of terminal facilities, land reclamation, or water-power improvement that could be considered in connection with an improvement here.

10. I am of the opinion that as there already is a channel between the bell buoy off Pooles Island and the 35-foot channel leading to Baltimore ample to accommodate any vessel that can navigate the upper bay, Chesapeake Bay, Md., off Pooles Island, on the route between Baltimore and Philadelphia, between the southwest bar and the northeast bar is not worthy of improvement by the General Government at the present time.

LANSING H. BEACH.

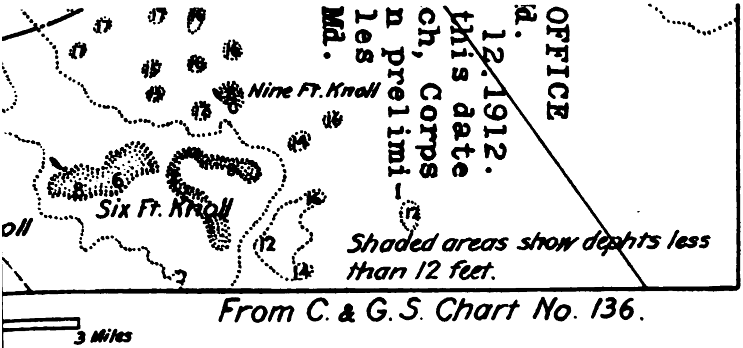
[First indorsement.]

UNITED STATES ENGINEER OFFICE,
New York City, December 17, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

Forwarded, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers, Division Engineer.



From C. & G. S. Chart No. 136.

House Doc. No. 1406 **; 62d Cong., 3d Sess.**

62d Congress, } HOUSE OF REPRESENTATIVES. { Document
3d Session. } { No. 1410.

NEW RIVER FROM RADFORD, VA., TO HINTON, W. VA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF NEW RIVER, FROM RADFORD, VA., TO HINTON, W. VA.

February 20, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 19, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 17th instant, together with copy of a report from Maj. F. W. Altstaetter, Corps of Engineers, dated November 21, 1912, on preliminary examination of New River, from Radford, Va., to Hinton, W. Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 17, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of New River from Radford, Va., to Hinton, W. Va.

1. There is submitted herewith, for transmission to Congress, report dated November 21, 1912, by Maj. F. W. Altstaetter, Corps of Engineers, on preliminary examination of New River, from Radford,

Va., to Hinton, W. Va., called for by the river and harbor act approved July 25, 1912.

2. New River rises in western North Carolina and flows in a general northerly direction, uniting with the Gauley River to form the Kanawha River. Hinton is located 57 miles above the mouth and Radford 84 miles farther up. The river flows through a sparsely settled, rugged mountain country. From Hinton to the head of slackwater in the Kanawha River, a distance of 64 miles, the fall is almost 750 feet. This whole section is unfavorable for navigation, and the district officer states that the river above it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount. The stretch under consideration must therefore be considered independently. From the investigation made by the district officer, it appears that there is no demand for river improvement over this section, and that an improvement of value would require the construction of locks and dams at considerable cost. He is of opinion that the river between Hinton and Radford is not worthy of improvement by the United States, and in this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of December 23, 1912, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of New River, from Radford, Va., to Hinton, W. Va., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 23, 1912.

The Chief of Engineers, United States Army.

1. Hinton is located at the confluence of New River and the Greenbrier, 57 miles above the mouth of New River and 64 miles above the head of slack-water navigation on the Kanawha River. On this reach the fall is 750 feet, and navigation is therefore impracticable. Radford is 84 miles above Hinton, the fall on this reach being 348 feet, or over 4.1 feet per mile. The upper 54 miles of this reach—Glenlyn to Radford—is paralleled for most of the way by two railroads. From Glenlyn to Hinton, 30 miles, the fall is 128 feet. There is no railroad along the banks of this portion of the stream, but the district officer states that no part of it is more than 15 miles from a railroad.

2. There is no navigation on the reach between Radford and Glenlyn and none is demanded by those in the vicinity who were given an opportunity of expressing an interest in the subject. Some indefinite expressions of interest were shown in regard to the reach between Glenlyn and Hinton, but these were vague and appeared to recognize the fact that the great fall in the river would preclude any form of continuous navigation, except through slack watering the stream.

3. The country adjacent is sparsely settled, and the chief occupation of the inhabitants is farming and stock raising. Just above Radford some iron ore is mined and there are some small lead mines in that vicinity.

4. About $110,000 has been expended on this river in improving the bars by building chutes or sluiceways through them. This afforded possible light-draft navigation and was used to some extent a number of years ago. But little has been done on this river since 1882. There is a very small commerce carried on in the lower part of the reach under consideration by the use of so-called keel boats, which are towed or poled. There being no connection with the river below, the commerce is local.

5. The district officer reports that between Glenlyn and Radford there is no particular need or demand for improvement, and that between Hinton and Glenlyn the commerce is small and the depth of the water now maintained is sufficient for present demands. He therefore reports that the river is unworthy of improvement, and in this view the division engineer concurs.

6. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on this subject have been received.

7. There is very little commerce on this river at present, and as there are no commercial or mining industries of importance, no material increase could be expected even if it were improved. Physical conditions are such that it could not be improved for useful navigation except at prohibitive cost. The board, therefore, reports, concurring with the views of the district officer and the division engineer, that it is not advisable for the United States to undertake the improvement of New River from Radford, Va., to Hinton, W. Va.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF NEW RIVER FROM RADFORD, VA., TO HINTON, W. VA.

War Department,
United States Engineer Office,
Wheeling, W. Va., November 21, 1912.

From: Maj. F. W. Altstaetter, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of New River from Radford, Va., to Hinton, W. Va.

1. In compliance with letter of August 3, 1912, from the department, the following report on the preliminary examination of New River from Radford, Va., to Hinton, W. Va., is submitted, as required by the river and harbor act approved July 25, 1912.

2. The New River rises in western North Carolina and flows in a general northerly direction, uniting with the Gauley River to form the Kanawha River. Hinton is located 57 miles above the mouth of New River, and Radford is 84 miles farther up, or 141 miles above the mouth. The drainage area above Hinton is 5,600 square miles and above Radford 2,725 square miles. Drawing K12/51 (inclosed herewith) shows the river from Hinton and Radford and also its position with respect to the main lines of transportation in the vicinity.

3. The entire New River flows through sparsely settled rugged mountain country. There are no towns of any size between Hinton and Radford. According to the census of 1910, the population of the adjacent counties was as follows:

Summers County, W. Va	18,420
Mercer County, W. Va	38,371
Monroe County, W. Va	13,055
Giles County, Va	11,623
Pulaski County, Va	17,246
Montgomery County, Va	17,268

The principal cities are Radford and East Radford, Va. (6,202); Pearisburg, Va. (646); Hinton and Avis, W. Va. (5,088). There is a small hamlet of Glenlyn, with a population of 52, situated 30 miles above Hinton, where the Norfolk & Western and Coal & Coke Railroads leave the river.

4. The inhabitants are engaged chiefly in farming and stock raising. There is a small quantity of timber and staves marketed. There is no underlying coal, the New River fields being some distance from the section under consideration. Just above Radford some iron ore is mined, and there are also some small lead mines in that vicinity.

5. From Hinton to the head of slack water in the Kanawha, a distance of 64 miles, the fall is almost 750 feet. There are many bridges and steep rapids along this portion, including Kanawha Falls, which is about 16 feet high. This whole section is unfavorable for navigation, and the river above it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount. The navigation between Hinton and Radford must therefore be considered as having no outside river connection. The Chesapeake & Ohio Railroad parallels the river from Hinton to its mouth and continues on down the Kanawha River.

6. *Physical characteristics.*—From Hinton to Radford the river is shown by seven drawings[1] (inclosed herewith), marked K12/52, 53, 54, 55, 56, 57, and 58. A survey of this river was made in 1873, and maps of that survey with other information obtainable were used in preparing the above drawings. The river has a breadth varying from 500 to over 1,000 feet, with an average breadth of about 600 feet. The lowest published discharge measured at Radford is given as 1,830 cubic feet per second, but as the discharge in the Kanawha River has been measured as low as 1,100 cubic feet per second, that in the New River is probably lower than indicated above. From a study of the gauges at Radford and Hinton and other sources it appears that at extreme low water the controlling depths over the bars may drop to less than 1 foot. This is due to the great rapidity of the current, the drop between these two places being about 348 feet. The headwaters of the river being in some of the highest mountains east of the Rockies a good discharge is ordinarily maintained, and 2 feet found over the bars. From Hinton to the vicinity of Glenlyn a boat drawing 2 feet will have sufficient depth of water for navigation at practically all times. Mean stage conditions give 3 feet over nearly all bars. The river, however, partakes of the characteristics of a mountain stream, with very rapid current and bad rapids, and therefore navigation is dangerous on it.

The drop of the surface of the water is shown in the profiles on the drawings. This whole country has outcroppings of rock over much of the area. The river bottom and banks are rock in many places, so that little change has taken place in years except that the iron-ore washings in the upper river have deposited sediment in the quieter and deeper reaches, and where improvements have been made at the bars loose stones placed there have been moved.

The valley is generally narrow, with many steep bluffs frequently rising sheer from the water's edge. At places there is a narrow bench of fertile soil lying quite low, but most of it is well above flood stages.

The Weather Bureau reports 14 feet as a flood stage, both at Hinton and at Radford. At the Radford gauge the extreme variation of water recorded is 36 feet, while at Hinton it is 22.5 feet.

7. *Previous examinations, etc.*—The previous examinations and reports on this portion of the New River have been made as follows:

First. Survey of 54 miles of the river between Sinking Creek and Greenbrier River was made in 1819 by Moore and Griggs, under the auspices of the board of public works of the State of Virginia, with a view to connecting the waters of the James and Kanawha Rivers by that route.

Second. Examination for 128 miles from the lead mines in Wythe County to the mouth of the Greenbrier River at Hinton. (See Annual Report Chief of Engineers, 1873, pp. 78 and 842.)

Third. Examination of the New River, W. Va., at its confluence with the Greenbrier River. (See Annual Report Chief of Engineers for 1904, pt. 3, p. 2617.)

8. *Work done.*—The only work done in the past has been the improvement of some of the bars by building a channel chute or sluiceway across them. This channel was about 50 feet wide and 2 inches deep at extreme low water, and was made by cutting out rock where necessary and piling up stones along the sides of the chute

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[1] Not printed.

to direct the water through it. The work extended from Hinton for a distance upstream of about 25 miles. About $110,000 was expended in this work. The last work was done in 1882, except for the expenditure of $10,000, and the chutes have deteriorated in the meantime due to the natural action of ice and the current.

9. *Commerce.*—Above Glenlyn the river is paralleled most of the way by two railroads, and there is no river commerce. From Hinton to Glenlyn, a distance of 30 miles, there is some commerce, consisting of lumber, staves, sand, gravel, and also some grain, hay, farm products, and miscellaneous merchandise. No statistics are on hand, but I am informed that the commerce at Hinton amounts to about two railroad carloads per day, and, as Hinton is the only town on this 30-mile section, this is some measure of its amount. This estimate of two carloads a day is thought to be excessive and is believed to be true only at times. In 1883 there were about 17 keel boats in this traffic, and there are said to be 10 or 12 such boats now on the river. These keel boats, as they are called, are the popular boats for this traffic, having an average length of 60 feet, width of 6 to 8 feet, and carrying 20,000 to 27,000 pounds. Their draft is generally about 2 feet. The commerce is altogether local. During the winter season, from December 1 to April 1, the roads are in poor condition, and the inhabitants experience difficulty in transportation of supplies. The section from Glenlyn to Hinton lies almost entirely in Summers County and only traverses about one-half of it. Summers County had a population, at the last census, of 18,420. Probably no more than 2,000 or 3,000 people at most are in any way dependent upon this section of the river. The improvement of the river would probably cause a small increase in commerce, but not a very large one, as there is nothing to move.

10. *Obstructions.*—The following is a list of bridges, with principal span, and clearance above low water:

Norfolk & Western Ry. bridge at Radford—	
Principal span	130 feet.
Clearance	31 feet 7 inches.
Highway bridge at Radford—	
Principal span	114 feet.
Clearance	57 feet 2 inches.
Norfolk & Western Ry. bridge near Pepper—	
Principal span	140 feet.
Clearance (about)	33 feet.
Highway bridge at Eagleston—	
Principal span	225 feet.
Clearance	34 feet 5 inches.
Norfolk & Western Ry. bridge at Ripplemead (Big Stoney)—	
Principal span	110 feet.
Clearance	32 feet.
Highway bridge at Ripplemead—	
Principal span	150 feet.
Clearance (estimated)	32 feet.
Highway bridge at Narrows, Va.—	
Principal span	216 feet 9 inches.
Clearance	27 feet 8 inches.
Virginia Ry. bridge at Glenlyn—	
Elevation extremely high. No data as to dimensions.	
Highway bridge at Hinton—	
Principal span	242 feet 6 inches.
Clearance (middle of second span)	53 feet 5 inches.

There are no dams in this section of the river.

11. *Improvement desired.*—The inhabitants between Glenlyn and Radford seem to have no desire whatever to have the river improved. The following are quoted from statements made by some of the citizens in this section:

> Can see no advantage in the project, that part of the State being well provided for with railroads.
>
> Never heard of anyone who wanted any improvement of the river.
>
> Think the cost would be very excessive for the benefits that would be derived.
>
> The idea is entirely new to me; never heard it discussed.
>
> Do not know of any demand for an improvement.
>
> Do not think any use would be made of the slack water if provided.
>
> Do not know of any demand for river improvement.
>
> Regard this scheme as entirely impracticable; in fact, consider it foolish to contemplate.
>
> See no demand, either present or prospective, for slackwater navigation.
>
> Do not think it practicable to improve a short piece of the river without an outlet in the Ohio, which is, of course, impracticable.

From Glenlyn to Hinton inquiry among the inhabitants revealed no one who had heard anything about a possible improvement, but they were more favorably impressed with the idea than the inhabitants in the section from Glenlyn to Radford. Briefly, they favored some form of slack-water navigation, and thought that the river was not suitable for improvement except by slack water. The following are statements made by various prominent citizens of this section:

> Anxious to see something done that would open up the country.
>
> Consider it would be more advantageous for a pool of water from Narrows to Hinton.
>
> Think that section certainly needs something done to develop it.
>
> Think that section of river between Glenlyn and Hinton deserves an improvement.
>
> Think it probable that most of the timber adjacent to the river has been cut, but there remain great quantities of staves, ties, bark, etc., that will continue for years and that could profitably be shipped by water.
>
> The chutes made years ago by the Government are used by bateaux in shipping sawed lumber, etc.
>
> Consider this the worst tied-up country I ever saw.

12. *Conclusions and recommendations.*—Between Glenlyn and Radford there is no particular need for improvement of the river and no particular demand for it. Between Hinton and Glenlyn there is no point more than 15 miles from the railroad, and that is not an excessive distance to go by wagon. The number of people and the amount of commerce to be benefited by improvement is small. The depth of water now maintained over this reach is sufficient for the present demands of commerce the principal objection being the swift current. This could be obviated only by slack-water improvement, which would require 10 dams with a lift of 13 feet each, or their equivalent. It is not believed that the river between Hinton and Radford is worthy of further improvement and it is recommended that no survey be made.

ADDITIONAL SUBJECTS.

13. *Terminal facilities.*—There are practically no terminal facilities for river traffic along this entire section and no mechanical appliances except a simple elevator at Hinton for loading crossties into railroad cars. This is owned by the Chesapeake & Ohio Railroad Co., is seldom used, and is available to the public. There being such little commerce, there seems to be no special demand for terminal facilities.

14. *Water power.*—Due to the great fall of the river, the narrow sparsely inhabited valley, and the large low-water discharge of the New River, the question of using the water power would merit considerable attention should the river ever be improved by means of locks and dams; in fact, water power could be developed in such large quantities that if a combined water power and navigation project should ever be carried out, navigation would probably be a secondary consideration. At Kanawha Falls, below Hinton, a water-power plant is now established, while above Radford water power is also being developed in the New River. As the total fall from Glenlyn to Hinton is 128 feet and the low-water discharge probably over 1,000 cubic feet per second, the amount of water power available is apparent. Above Glenlyn the presence of the railroads, which are quite near the water surface, would complicate the matter should high dams be built. Coal, however, is very cheap in this vicinity, so that water-power development may not be as attractive as appears on the surface.

15. *Other subjects.*—There are no other subjects deserving of consideration in this connection.

F. W. ALTSTAETTER.

[First indorsement.]

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
November 29, 1912.

The CHIEF OF ENGINEERS:

1. I concur in the views of the district officer, and do not consider it advisable to undertake the improvement of New River at this time.

2. In addition to the examinations referred to by the district officer there have been the following:

Examination from the lead mines in Wythe County to the "Mouth of Wilson" in Grayson County, Va. (Annual Report for 1875, pt. 2, p. 133).

Survey from lead mines in Wythe County to the mouth of Wilson Creek in Grayson County, Va. (S. Ex. Doc. No. 41, 45th Cong., 3d sess.; Annual Report for 1879, pt. 1, p. 538).

3. The report of Col. William P. Craighill, Corps of Engineers, recommending suspension of work on New River, is given in the Annual Report for 1891, part 4, page 2431.

H. C. NEWCOMER,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For Report of the Board of Engineers for Rivers and Harbors, see p. 2.]

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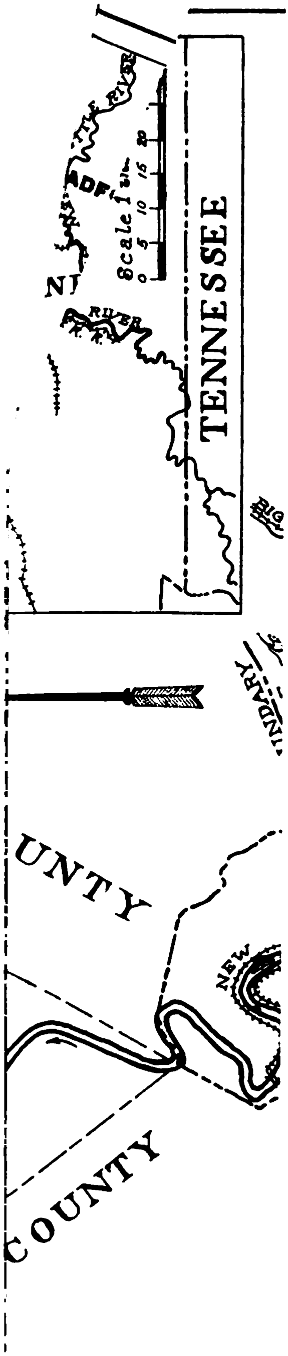

To Accompany my I
the Chief of Engi
U.S.A. dated Nov. 21

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1416.

WILLS STRAIT, CASCO BAY, ME.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF WILLS STRAIT BETWEEN ORRS AND BAILEY ISLANDS, CASCO BAY, ME.

February 22, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 21, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 20th instant, together with copies of reports from Lieut. Col. W. E. Craighill, Corps of Engineers, dated November 1, 1912, and January 22, 1913, with map, on preliminary examination and survey, respectively, of Wills Strait between Orrs and Bailey Islands, Casco Bay, Me., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 20, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Wills Strait between Orrs and Bailey Islands, Casco Bay, Me.

1. There are submitted herewith, for transmission to Congress, reports dated November 1, 1912, and January 22, 1913, with map, by Lieut. Col. W. E. Craighill, Corps of Engineers, on preliminary exami-

nation and survey, respectively, of Wills Strait between Orrs and Bailey Islands, Casco Bay, Me., called for by the river and harbor act approved July 25, 1912.

2. Wills Strait is a narrow, crooked passage between the waters of Harpswell Sound on the west and deep water in Casco Bay on the east. It is obstructed by several shoals which render navigation difficult. The passage is used by a large number of small boats engaged in fishing and in carrying supplies to the adjacent territory. From his investigation of the matter the district officer is of opinion that the locality is worthy of improvement to the extent of providing a channel 8 feet deep at mean low water, 70 feet wide at the eastern passage, full width of 40 feet through the proposed drawbridge, with the approach on the southerly side of the draw widened so as to make the entrance easier. The estimated cost of the improvement is $16,500, and the district officer states that it is practically certain that there will be no cost for maintenance. The division engineer concurs in recommending the project outlined above.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of February 10, 1913, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report as follows: That the improvement by the United States of Wills Strait between Orrs and Bailey Islands, Casco Bay, Me., is deemed advisable so far as to secure an available channel depth of 8 feet and channel widths as stated above, following in general the methods described in the report of the district officer, at an estimated cost of $16,500 for first construction, this estimate being based on the supposition that the construction work will, as now seems desirable and advantageous, be prosecuted under a first appropriation of the full amount of the estimated cost.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
February 10, 1913.

The Chief of Engineers, United States Army:

1. Wills Strait is a narrow, obstructed passageway between the waters of Harpswell Sound on the west and Casco Bay on the east, about 14 miles a little north of east of Portland, Me. Were it not for this strait vessels would have to go outside of Jaquish Island, 3 miles to the southward, where the route is exposed to the open sea. On account of the protection offered, the cut through the strait is of great value and importance to light-draft navigation. Many small vessels, estimated during the summer season at 100 per day, engaged in fishing, freighting, and in the pursuit of pleasure pass through this strait.

The amount of commerce handled has not been definitely determined, but the district officer states that the improvement desired, which is a straighter and deeper channel through the dangerous and obstructed waterway, would be of great value to navigation, and would probably tend to the preservation of both life and property.

2. Based upon the survey just made and a further study of conditions obtaining at this locality, the district officer concludes that a channel depth of 8 feet at mean low water and width of 70 feet at the eastern passage, full width of 40 feet through the drawbridge, with the approach on the southerly side of the draw widened so as to make the entrance easier, is essential for the convenient and safe handling of vessels through this passageway. The estimated cost of the work proposed is $16,500, and it is stated that it is practically certain that there will be no cost for maintenance. The district officer and the division engineer recommend the improvement in accordance with the project just outlined.

3. While the freight tonnage passing through this waterway is probably not very large, a great many vessels utilize it, and the improvement, which would be largely the removal of submerged rock obstructions, would lend an element of safety and confidence to navigation at this locality, and it is believed that the cost involved, considering that there will probably be no charge for maintenance, is reasonable. The board therefore concurs with the district officer and the division engineer and reports that in its opinion it is advisable for the United States to undertake the improvement outlined by the district officer, at an estimated cost of $16,500, the whole of which should be made available in one appropriation.

4. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF WILLS STRAIT, CASCO BAY, ME.

United States Engineer Office,
Portland, Me., November 1, 1912.

From: Lieut. Col. W. E. Craighill, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Wills Strait, Casco Bay, Me.

1. The following is a report on a preliminary examination of Wills Strait, between Orrs and Bailey Islands, Casco Bay, Me., directed by the river and harbor act approved July 25, 1912.

2. This locality is shown on Coast Survey Chart No. 315 of Casco Bay, Me. It is about 14 miles, a little north of east, from Portland, Me. The strait, so called, is narrow, crooked, somewhat obstructed by shoals, and forms a passage from the waters of Harpswell Sound

on the west to deep water in Casco Bay on the east. Casco Ba includes the waters between Portland and Cape Small, which li eastwardly from Portland about 21 miles. The indentations of th bay, which are many, extend in a northeasterly direction from a lin connecting these points, in some cases to a distance of about 15 mile As the indentations or estuaries are numerous and deep, travel ea and west, and to a certain extent north and south, has necessarily be by boat. As a consequence a condition prevails which is chara-teristic of the entire Maine coast. The travel equipment of a famil or homestead consists in a boat or boats instead of horses and wagon as in other communities. Families go to the store in boats, visit the neighbors by boats, and their livelihood for a great part is taken fro the sea.

3. Wills Strait is one of those short cuts frequently found by whi boats are enabled to move east and west, saving more or less length journeys through exposed localities and rough waters. In the pre-ent instance, were it not for this strait, vessels would have to go ou-side of Jaquish Island, 3 miles to the southward, and exposed to th open sea. In pleasant summer weather this might not be regard as much hardship, but in the rough weather which prevails durin fall, winter, and spring it is practically impossible for small boats t undertake the trip. Therefore the short cut assumes a great valu and importance.

4. I have visited the locality on at least two occasions and hav had interviews and hearings with persons interested. While for th most part there appears to be sufficient depth to satisfy those interested, there are shoals which give but from 3 to 5 feet depth at mea low tide, and the passage is somewhat difficult on account of obstruc-ing shoals and ledges which make the channel crooked. During certain conditions of wind and tide currents of from 3 to 4 miles per hour it is stated, are developed. Observations made under my direction fai to confirm this, though it is true that abnormal conditions of wind and tide did not exist at that time.

5. What seems to be desired is that a depth of about 7 feet at mean low tide shall be secured in such manner as to permit of a fairly direct course. This will permit the passage of boats drawing 6 feet at mean low tide with increased depth as the tide rises, the mean rise in Casco Bay being about 9 feet. No expression has been had as to the width, but it should not be less than 100 feet, except immediately in the narrowest part of the straits, where bold ledges on either side and a drawbridge proposed to be built will narrow the width to about 40 feet.

6. This locality has long been a favorite resort for summer visitors, both local and from a distance, and is rapidly assuming greater importance and population. The town of Harpswell, within which Bailey and Orrs Islands lie, is now proposing to construct a bridge across Wills Strait at an estimated cost of about $25,000, in order to accommodate those who desire to drive or motor from the mainland to Bailey Island.

7. It is impracticable to give any definite figures as to the commerce or tonnage. The following letter from a summer resident of the bay, eastwardly from Wills Strait, contains a statement of the business interests, of the character and value of the operations, of

the desire for improvement, and in what way conditions are expected to be improved:

CUNDYS HARBOR, ME., *September 4, 1912.*

DEAR SIR: Replying to your favor of August 22, I will try to give you all the information I have been able to gather regarding the amount of traffic through Wills Strait and the reasons why the people living along the shores of the eastern part of Casco Bay believe that the Government should straighten, widen, and deepen the channel through the straits.

Between Small Point and Jaquish along the shores of the bay there are estimated to be about 1,500 permanent residents, and during the summer this number is largely increased.

The people are supplied by 13 stores located as follows: Cards Cove, 1; Cundys Harbor, 3; Phippsburg, 1; Sebasco, 2; Water Cove, 1; Ashdale, 2; Small Point Harbor, 3.

These stores are estimated to do a business of $400,000 per year, and all their supplies are brought from Portland by four gasoline freight boats of about 14 tons each, which almost invariably use the Wills Strait passage in going to and coming from Portland, and they average each about 90 trips per year. If anything should happen to close the straits for a week the inhabitants would suffer for supplies, as the storekeepers' capital is not large and they carry light stocks. These four boats have all they can do to carry the supplies needed, and I have known times even in summer when four of these stores were out of staple articles because the freight boat did not get around when expected.

There are 28 sloops and schooners, mostly engaged in fishing, as follows:

Sloops.	Tons.	Sloops.	Tons.
Maud B. Morse	6	Ada May	4
Nellie F. Wotton	8	Vinal Tibbits	7
Glad Tidings	6	Bennie	7
Little Foster	5	Hobson	5
Uno	8	Rara Avis	5
Sapolio	5	Jennie R	6
Alice G	7	Laconia	10
Elvia and Alice	6	Sherman Benner	5
Hazel B	8	Florence Simons	5
Isabel Parsons	8	Fannie L	5
Minerva	10	Idyle Wild	5
Schooner Lizzie May	14	Aphrodite	4
Sloop Olympia	8	Schooner Edith M. Thompson	(1)

[1] Lobster smack.

Most of the above vessels have power. Sloop *Nellie G. York*, 8 tons, pleasure parties in summer. Schooner *Laura and Marion*, 30-ton freight schooner; no power.

In fishing and lobstering there are about 200 boats engaged, mostly Hampton boats and power dories, some rowing dories.

In addition there are at least 75 motor boats used by summer residents for pleasure.

There are about 300 men engaged in the fishing and lobstering in the eastern end of the bay and it is estimated that the number of lobster traps will reach 8,000. (According to report of Mr. Johnson, fish warden, Sagadahoc County, lobster men set 3,800 traps and these are nearly all west of Small Point.) Counting 100 lobsters to a trap per year, weighing 1½ pounds each, and an average value of 20 cents per pound, would make the value of the lobster catch, between Small Point and Jaquish, $240,000 annually, all of which finds its way to Portland via Wills Strait.

There are two or more gasoline lobster smacks engaged in gathering lobsters from the fishermen and they pass through Wills Strait about twice daily except Sundays. There is no record of the fishing business, but the estimate of a number of men engaged in it is that the fish catch equals the lobster catch in value, say, $240,000 annually; making a total merchandise value of $480,000 annually, going west to Portland and Gloucester and with the supplies coming in of $400,000, a total of $880,000 annually, the bulk of which passes through Wills Strait. In addition the value of the boats and vessels engaged in the fishing, lobstering, and freight business is at least $120,000.

As to the number of boats passing through Wills Strait daily, the estimate is about 100 during the summer months.

The channel through the strait is now tortuous and dangerous, being obstructed at its eastern entrance by a ledge; about three-quarters of the way through by a bar of sand, gravel, and rock, and just opposite the western entrance by Reubens ledge. Boats passing through from the east have to run in a southerly direction till opposite, or a little south, of the entrance, then swing northerly to enter the passage and when in, swing westerly; all in a space of about 100 feet, then when inside, they have to cross the sand, gravel, and rock bar, on which, at low tide, there is often not over 3 feet of water, especially when the wind is strong from the north or northwest and the tide ebbing. Then right opposite the western entrance is Reubens ledge, 200 feet from the entrance, and a boat of any size, say from 40 feet or more, passing through to the west must begin to swing toward the south to avoid the ledge, while still in the gut, and when past the ledge it must swing again short in a northerly direction.

In good weather most of the sloops and Hampton boats, in going to and from Portland, go through Jaquish cut; or outside Jaquish, if the sea is very smooth, rather than risk the passage through Wills Strait, when loaded. Nearly all of them have grounded on the sand and gravel bar, or been set ashore at either entrance to the channel, at some time, and the crews have been in danger of losing their lives. When the wind blows strong from the north or northwest and the tide is ebbing there is a current estimated at from 3 to 4 miles per hour, running easterly through the channel entrances; and when the wind is strong from the south and the tide flooding, the current is equally strong in the other direction. It is when the winds are strong and the weather bad that these vessels are compelled to use the straits, because, as every one in this section knows, it is very rough off Jaquish Point in bad weather and no large sea-going vessel could live without going away outside of half-way rock. Only about a week ago the freight boat *Wilkin Second*, a 14-ton boat with two 8-horsepower gasoline engines, was set against the rocks at the eastern entrance of Wills Strait, when there was only a moderately strong easterly wind and the tide flood. The pilot of *Wilkin Second* told the writer that there was a sloop ashore on the northerly side of the entrance and his attention was diverted for a fraction of a minute to the sloop ashore, and when he undertook to swing to make the entrance the *Wilkin Second's* stern would not come around against the tide and it pushed her ashore before he could help it.

Numerous accidents of this kind can be cited and in some there would have been loss of life if assistance had not been rendered from the shore.

Now, what is needed to improve the channel through the strait is, first, to remove about 50 or 60 feet of the ledge on the northeasterly side of the eastern entrance. Second, to remove the sand, gravel, and rock bar near the westerly entrance. Third, to remove that part of Reubens ledge opposite the westerly entrance. All these obstructions to be blown out and the débris removed to give a depth of about 7 feet or more at low tide. And also to dredge a channel 7 feet deep at low tide between what is called Coxs ledge and Baileys Island, right opposite to the westerly entrance to Wills Strait. This would save a detour of nearly a mile in making the strait.

However, kindly do not understand me as asserting positively that the work I here recommend is the best thing to be done or all that is needed. The able engineers of the War Department, after a survey of the straits, will be better able than I am to decide how best to improve the channel. I am simply voicing the opinions of fishermen and freighters in my recommendations, and state what they think ought to be done to improve the channel.

These improvements will result in making the channel safe and passable in all kinds of weather and at any stage of the tide for all kinds of boats such as are likely to ever need to use the straits. In addition, it will make it possible to have regular daily steamboat service between the eastern end of Casco Bay and Portland, and will materially increase travel and bring in people to take advantage of the cheap summer home sites now available at lower prices than anywhere else on Casco Bay.

At present the traffic does not warrant the running of an ocean-going steamer, and a river or bay boat 100 feet or more in length would have great difficulty in making the short turns necessary to pass through Wills Strait.

Several land development plans are now under way, and will be materially helped in bringing in residents if a daily service to Portland was established. A company has been formed for the purpose of putting on such a boat, fit to navigate the bay but not fit to go around Jaquish in bad weather. With the present amount of travel an ocean-going steamer, such as would be fit to run Jaquish in any kind of weather, is prohibited on account of its cost. In 1908 a steamer of the Harpswell line ran to Sebasco, Cundys Harbor, and the Gurnet Bridge. The Casco Bay Line put on a steamer in opposition, and finally acquired the Harpswell Line; since then there has been no daily steamer from Portland to this end of the bay.

It is common talk that the Casco Bay and Harpswell Lines are behind the movement to have a bridge built across Wills Strait, with the idea of corking up the passage so that no practicable steamer from Portland can pass through, and thereby interfere with their monopoly of the Casco Bay traffic. When, in spite of this corking up, the business at this end of the bay has grown to proportions sufficient to satisfy this corporation that there may be some money in it for them, they will undoubtedly extend their service to this end of the bay.

In the days before gasoline engines came into use the men used to fish from sloops and schooners; but when the gas engine came into use they abandoned the old way, and each man got a motor boat of his own and fished for himself, as most of them do yet. Three years ago there was hardly any fishing done from sloops and schooners, but since that time about 25 sloops have come into use, as the men found it very risky fishing offshore alone in boats without sails. It looked at one time as if the old seafaring art was a thing of the past, and that there would be no more seamen in this section; but now the number of sailing vessels (mostly with auxiliary power) is rapidly increasing, and seamanship is being acquired. It seems to me that the General Government ought to encourage this revival of sailor making, and one way to do it is to open the channel of Wills Strait so that these sloops, which now draw from 4 to 9½ feet of water, can pass through at all times in safety.

I sincerely trust that your report as to the feasibility and advisability of improving the channel through Wills Strait will be favorable and that you will recommend that the petition of the fishermen and other inhabitants of the eastern part of Casco Bay (signed by 170) be acceded to, and that the Rivers and Harbors Committee advise an appropriation for the purpose of improving same.

Very respectfully, yours,

JAS. WILLIAMSON.

Lieut. Col. W. E. CRAIGHILL,
Corps of Engineers.

8. While it is my opinion that the amount of business or commerce concerned or interested in the improvement of Wills Strait is overestimated by Mr. Williamson, the improvement desired will, in my judgment, be of great value to navigation, will probably tend to the preservation of both life and property, and will serve interests of sufficient importance to justify me in declaring that the locality is worthy of improvement by the National Government, provided satisfactory improvement can be secured within reasonable cost, the determination of which will require a survey.

9. There are no wharves in connection with this passage, nor is there any call or need for any. The locality is many miles from the nearest railroad station and practically all traffic is by water. There are no questions of land reclamation or water-power development to be considered in connection with a plan for improvement at this locality.

10. For an understanding of the general location, reference should be had to Coast Survey chart No. 315. A reconnoissance map[1] showing characteristic soundings, etc., developed during a recent study of the proposed bridge location, is herewith.

W. E. CRAIGHILL.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, November 4, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

Concurring in Col. Craighill's recommendations.

W. M. BLACK,
Colonel, Corps of Engineers.

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[1] Not printed.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, November 11, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. For reasons stated herein the board concurs with the district officer and division engineer in recommending a survey in order to determine the extent and advisability of the proposed improvement.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF WILLS STRAIT, CASCO BAY, ME.

UNITED STATES ENGINEER OFFICE,
Portland, Me., January 22, 1913.

From: Lieut. Col. W. E. Craighill, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through Division Engineer).
Subject: Survey of Wills Strait, Casco Bay, Me.

1. The following is a report on a survey of Wills Strait, between Orrs and Bailey Islands, Casco Bay, Me., made in compliance with directions contained in department letter dated November 14, 1912.

2. A preliminary examination of this locality was made under the requirements of the act approved July 25, 1912, and report thereon was submitted under date of November 1, 1912. In that report are submitted a description of the locality, of the interests desiring betterment, and an opinion based thereon that the locality is worthy of improvement by the National Government, with a statement that the demand appeared to be for a depth of 7 feet at mean low tide in such manner as to permit of a fairly direct course.

3. The field work of this survey was done in the early part of December, 1912, and a tracing herewith, which includes a vicinity map, shows the data collected at that time, with the proposed channel shaded.

4. No new information was secured during the short time the survey party was on the ground except that on December 3, 7 boats were observed to pass through; on December 4, 8 boats; on December 5, 24 boats; on December 6, 9 boats, and before 10.30 a. m. on December 7, 8 boats. These were mostly power fishing boats, although several were of larger size, including one large steam fishing boat. One sailing vessel was seen to anchor to await more favorable conditions of tide.. The period of observation was during the dull season. The increase in business during the summer season, on account of the summer visitors, is so much that it is not unreasonable to assume that, then, an average of 100 boats will go through the passage daily. Such information as I have secured since the date of my report on the preliminary examination confirms my opinion that the locality is worthy of improvement, and further consideration has convinced me that something more than outlined in my preliminary report will be necessary to accommodate navigation satisfactorily, especially as it is probable that a steamboat will be placed on this route soon.

5. A study of the map will show that, approaching the strait from the west the course rounds Cox's ledge, leaving it on the south, thence steering southwesterly through a broad, open passage, an abrupt turn to the east has to be made around the lower end of Reuben's ledge, thence a sharp turn to the south between the points of Bailey and Orrs Islands. The course then passes a narrow shoal with a least depth of about 6 feet, and then through a narrow, crooked, and dangerous passage about 600 feet farther east. At the latter place current conditions are sometimes difficult and dangerous.

6. The shoals are for the most part bare ledge, though there is a small amount of mud just to the south of the bridge location.

7. The town of Harpswell, within which this locality lies, is proposing, as indicated in my report on preliminary examination, to establish a bridge over the western passage between Bailey and Orrs Islands, and it is my intention to recommend the approval of a design which will give 40 feet clear width of opening across the channel.

8. Several projects for improvement have been studied in an effort to accommodate the traffic at a reasonable cost and to select a project which will give the greatest advantage in proportion to the cost. Considering the natural shape of the bottom and the fact that the excavation is to be in rock, a depth of 8 feet rather than 7, and widths slightly greater than the minimum that might be practicable seem best to recommend as giving a greater proportionate efficiency for a slightly greater cost. The project recommended provides for 8 feet depth at mean low water, 70 feet width at the eastern passage, full width of 40 feet through the drawbridge, with the approach on the southerly side of the draw widened so as to make the entrance easier. The estimated cost is $16,500. This is believed to give the greatest ratio of advantage per dollar of investment. The projects considered varied in cost from $12,500 for 7 feet depth and 80 feet width in the eastern passage to $21,500 for 9 feet depth and 60 feet width through the eastern passage.

9. After more study of the situation and further conversations with persons interested in the matter I have concluded that a depth of 7 feet at mean low tide will be so lacking in important advantage that it will not afford a commensurate return on the cost of securing it. The spring tides give a low water depth about 2 feet less than the mean. The mean rise of tide being 9 feet, the chief value of the improvement is for the time when the water level is below half tide, and the conditions at extreme low water of spring tides must be considered in order to insure uninterrupted traffic. Eight feet, therefore, giving a minimum of about 6 feet at extreme low water, gives about the least that will be of value in a rock cut such as this one will be. It is also proposed to establish two or more stone day marks to define the channel. These are necessary, as the ledge submerged at high water will be so near the edge of the channel. It is my opinion that Wills Strait, by reason of the present and prospective business involved and of its great local importance, is worthy of improvement by the National Government to the extent of the project recommended.

10. From the character of material and from the tidal and other conditions it is practically certain that there will be no cost for maintenance.

11. If the project be adopted the entire cost should be provided for in a single appropriation. The work to be done is all of the same

class, and in the interest of economy should be covered by a single contract. If energetically carried on, the work can be done in a single working season.

W. E. CRAIGHILL.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, January 25, 1913.

CHIEF OF ENGINEERS:

Concurring in the recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 2.]

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62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No 1418.

SULPHUR RIVER, TEX. AND ARK.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON SURVEY OF SULPHUR RIVER, TEX. AND ARK., FROM ITS MOUTH TO THE FORKS IN DELTA COUNTY, TEX.

February 22, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 21, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 19th instant, together with copies of reports from Capt. A. E. Waldron and Capt. T. H. Jackson, Corps of Engineers, dated September 22, 1910, January 30 and November 22, 1912, with map, on survey of Sulphur River, Tex. and Ark., from its mouth to the forks in Delta County, Tex., made in compliance with the provisions of the river and harbor act approved March 3, 1909.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 19, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Survey of Sulphur River, Tex. and Ark., from its mouth to the forks in Delta County, Tex.

1. There are submitted herewith, for transmission to Congress, report dated September 22, 1910, by Capt. A. E. Waldron, Corps of

Engineers, and reports dated January 30 and November 22, 1912, with map, by Capt. T. H. Jackson, Corps of Engineers, on survey of Sulphur River, Tex. and Ark., from its mouth to the forks in Delta County, Tex., called for by the river and harbor act approved March 3, 1909.

2. Sulphur River rises in northeast Texas, flows easterly approximately 265 miles, and empties into Red River, a tributary of Mississippi River, approximately 90 miles above Fulton, Ark. For the first 17 miles the Sulphur River has little depth, while the next 40 miles has a minimum depth of 6 feet. There is practically no navigation on Red River below the mouth of Sulphur River.

3. The existing project for improvement of this river, adopted by the act approved March 2, 1907, contemplates improvement by dredging and the operation of a snag boat. Expenditures on this work to June 30, 1912, have amounted to $39,068.23. The survey develops the fact that there is insufficient flow of water to permit of successful open river improvement, and the only practicable improvement would be by means of a lock and dam near the mouth of the river, which would be detrimental to drainage. There is little or no commerce on the river, except the rafting of logs, and the district officer expresses the opinion that further improvement of the stream is not justified. The division engineer concurs in this opinion.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of February 26, 1912, concurring with the views of the district officer and the division engineer. Moreover, in view of the conditions now disclosed, the board considers the present project unworthy of continuance.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, except as to the discontinuance of the present project, which, I think, should be given a few years' further trial over the lower 51 miles of river now already cleared of obstructions, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Sulphur River from its mouth to the forks in Delta County, Tex., in the manner apparently desired by the interests concerned, as described in the reports herewith, is not deemed advisable at the present time further than maintenance of its lower 51 miles of open channel already cleared under the existing approved project.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Tenth indorsement.]

The Board of Engineers for Rivers and Harbors,
Washington, February 26, 1912.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. This report of survey of Sulphur River from its mouth to the forks in Delta County, Tex., submitted in compliance with the act of

March 3, 1909, is in two parts, covering, respectively, the reaches, mouth to mile 126½, and from this point to the forks, a further distance of 68 miles, a total of 194½ miles. For reasons given the district officer recommends that the General Government make no further improvement of the Sulphur River at this time. The existing project, adopted by the act of March 2, 1907, contemplates improvement by dredging and the operation of a snagboat. The work accomplished has been the snagging of the lower 73½ miles. On this work about $24,000 has been expended.

3. In addition to the information contained in the reports of the district officer, the board has a communication from Hon. Morris Sheppard, M. C., and on January 3, 1911, Mr. Sheppard appeared before the board in behalf of the improvement.

4. The survey has disclosed rather a peculiar condition on this river. For the first 17 miles there is a fall of about 0.6 of a foot per mile, while for the next 38 miles there is a lakelike pool with a total fall of only 1 foot, above which the fall is again about 0.6 of a foot per mile. There is an insufficient volume of flow to permit of successful open-river improvement. If a channel were dredged through the lower reach the pool now having adequate depth for navigation would be drained and the whole river rendered unnavigable at low water. The only practicable improvement would be by means of a lock and dam near the mouth of the river. This would make navigation possible over a distance of about 55 miles, but this would be detrimental to drainage, which is the most important function of the river. Above this section the river is but little more than a drainage ditch, the width of the water surface at the time of the survey being from 2 to 60 feet and the discharge about 5 cubic feet per second. Above the forks the bed was practically dry.

5. There is at present little or no commerce on the river excepting the rafting of a few logs. It is claimed that this is all that is practicable in its present condition and that improvement is desired in order to afford transportation facilities for the products of the valley and to regulate freight rates. It is stated in a communication before the board that lignite and iron ore abound in the Sulphur Valley and that it would hardly be possible to measure the saving which would result if this ore could be barged down the Sulphur River, and thence down the Red to the Mississippi River and the Gulf. It should be noted, however, that the project for the Red River does not provide for a channel of sufficient depth to accommodate heavy barge transportation.

6. The present project was adopted without a survey, with the expectation that a navigable channel could be provided at a moderate expenditure. It now appears that much more extensive work is necessary, and after careful consideration of all available information the board has reached the conclusion that the amount of commerce, present and prospective, to be benefited by the proposed improvement is not sufficient to justify the probable cost of the work, and therefore it concurs with the district officer and the division engineer in the opinion that it is not advisable for the General Government to undertake any further improvement of the Sulphur River at this time. Moreover, in view of the conditions now disclosed the board considers the present project unworthy of continuance.

7. There are no wharves or terminal facilities on the river at present In compliance with law the board reports that there are no question of terminal facilities, water power, or other subjects so related to th project proposed as to render the improvement advisable in th interests of navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF SULPHUR RIVER, TEX. AND ARK., FROM ITS MOUTH T MILE 126½.

United States Engineer Office,
Dallas, Tex., September 22, 1910.

Sir: 1. In accordance with instructions contained in letter from th Office of the Chief of Engineers, dated March 9, 1909, I have the hono to make the following report upon survey of Sulphur River, Tex. an Ark., from its mouth to the forks in Delta County, Tex. This surve was authorized by river and harbor act approved March 3, 1909. N preliminary examination was made of this waterway, and inasmuc as the people of Texarkana had shown considerable interest in th Sulphur River, it was thought advisable to make a triangulation sur vey in order that reference marks of some future value would b obtained. The triangulation survey partly explains the great lengt of time required to collect and prepare data used in making thi report.

2. Sulphur River has a watershed of approximately 4,000 squar miles and flows in an easterly direction through heavily timbered, fertile bottom lands from 1 to 6 miles in width. These lands overflow from 1 to 15 feet in depth, caused chiefly by rises in Red Rive preventing the run-off of the Sulphur River, and has been known t cause an upstream current in Sulphur River for 50 miles.

3. The banks, which are stable and show very little signs of ero sion, are 20 to 25 feet high at the mouth, with occasional high bluffs, but decrease until at mile 17 they are only 6 feet in height. Abov this point they begin to increase, until at mile 42 they have attaine 20 to 25 feet in height and continue about this average to the hea of the survey. The banks are heavily timbered, with the exceptio of a few places cleared for farms.

4. From mile 126½ to the mouth of the river there is a fall of 5 feet, an average of 0.42 feet per mile, but there is not an average fal throughout the entire length; from mile 126½ to mile 55 there is fall of 41.43 feet, an average of 0.57 feet per mile; from mile 55 t mile 17 there is practically a lake, having a fall of only 1 foot in th 38 miles; from mile 17 to the mouth of the river there is a fall o 10.47 feet, an average of 0.62 feet per mile.

5. The river has been snagged for 60 miles above the mouth b the quarterboat, using dynamite and cutting overhanging trees. Th section of the river is comparatively free of snags, excepting th sunken logs, which could not be handled by this method of snagging. The first 8 miles of river is chocked by numerous clay hogbacks, which

have been shot up and loosened by the use of dynamite, but still resist the eroding power of the water. During low water it is impossible to go from mile 17 to the mouth of the river in the shallowest draft skiffs. Above mile 60 the river is practically filled with sunken logs and snags of all descriptions, and in places the overhanging trees nearly meet. The channel throughout the entire length is very tortuous and, excepting the lake section, is very narrow. The lake section (mile 17 to 55) will average nearly 200 feet in width.

6. There are five railroad bridges spanning the river. One of them, the Texarkana, Shreveport & Natchez bridge at mile 6.6, is a draw. All others are not draws and are located as follows:

Kansas City Southern at mile 25.85.
Texas & Pacific at mile 29.74.
The Munz Railroad at mile 76.80.
St. Louis & Southwestern at mile 105.1.

There are seven county or wagon bridges across the river. None of them have draw spans, and at three other places bridges have been washed away, leaving the piling standing to catch the drift, thus completely blocking the river.

7. The lower portion of the river has been cleared of the best portion of timber, but the upper part abounds with many species of oak, ash, gum, pine, pecan, and some cypress.

8. Outcroppings of lignite coal are to be found in the upper reaches of the river, and several shafts have been sunk. The promoters claim that coal in paying quantities has been found, but owing to lack of transportation facilities it was not possible to develop same.

9. Clays for manufacturing purposes are to be found along the river and are being developed on a small scale.

10. There are no wharf facilities for commercial purposes on the river, and the two most favorable places at which they could be built are Watsons Spur, where the Kansas City Southern Railroad crosses the river, and at Sulphur Station, where the Texas & Pacific Railroad crosses. There is no public ground available for this purpose.

11. There are no sites on the river at which water-power plants could be installed to advantage.

12. At present the river is used by pleasure boats and launches for towing of railroad ties and small boats engaged in the fishing business.

13. The act of March 3, 1909, directed that the survey be carried to the forks in Delta County, Tex. This is about 175 miles above the mouth. When the survey had reached to mile 126½ it was clearly evident that it would be absolutely impossible to improve the upper reaches of this river by any means except the most expensive—that of locks and dams—and that there would not be sufficient water in the river to maintain pools during the greater part of the year, even if locks were provided. The low-water discharge of the Sulphur River at this point would not exceed 15 cubic feet per second, although it was not measured. Such being the case, and inasmuch as the survey had consumed considerable time, the field work was stopped during February, 1910, and the remainder of the time consumed in preparing the maps of the lower river.

14. By placing a lock and dam near the mouth of the river and dredging a channel into the Red River, the lower 60 miles of the

river might be made navigable, but no estimate is submitted for this, as it is not believed proper to improve a river which empties into the Red River above Shreveport, La., until the Red River below Shreveport is used more for navigation than it is at present.

15. The only argument which would justify the Government to go to the expense of improving this stream would be the question of its effect on freight rates. It has been stated that the mere existence of a navigable waterway will cause a reduction in freight rates whether the waterway is used or not. This remains to be demonstrated, but experiences seem to indicate that a river must be used to effect a reduction. If an improved waterway will cause a reduction in freight rates, even though it is not used, it would seem that such a reduction could be accomplished by other means than expending money in river improvement. The use of the Red River below Shreveport indicates that the Sulphur above Shreveport would not be used to a great extent if improved.

16. For the reasons stated above it is recommended that the General Government make no further improvement of the Sulphur River at this time.

17. Attached hereto is a letter[1] recently received from the Hon. Morris Sheppard, which describes quite fully some of the advantages that might come from the improvement of the Sulphur River.

Very respectfully,

A. E. WALDRON,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., September 27, 1910.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the report of the district officer that the Sulphur River appears unworthy of improvement at this time to any further extent than has already been authorized by Congress.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, May 8, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. The item of law calling for this report on survey provides as follows: Survey of Sulphur River from its mouth to the forks in Delta County, Tex. It appears that this reach is about 175 miles in length and that the survey was carried only to a point about 126½ miles above the mouth.

3. In explanation of this fact, the district officer states: When the survey had reached mile 126½ it was clearly evident that it would be

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[1] Not printed.

absolutely impossible to improve the upper reaches of this river by any means except the most expensive—that of locks and dams—and that there would not be sufficient water in the river to maintain pools during the greater part of the year, even if locks were provided.

4. As the call for a survey of the whole reach from the mouth to the forks in Delta County is mandatory, it is recommended that the district officer be requested to complete the survey. Under the circumstances a very inexpensive survey would appear admissible.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

[Fourth indorsement.]

War Department,
Office of the Chief of Engineers,
Washington, May 24, 1911.

1. Respectfully referred to Capt. Thos. H. Jackson, Corps of Engineers, inviting attention to the report of the Board of Engineers for Rivers and Harbors in the foregoing indorsement, particularly to paragraph 4 thereof.

2. Capt. Jackson is requested to complete the survey in accordance therewith, and submit the additional information thus secured in a supplementary report.

3. Any expense connected with this duty should be paid from the appropriation for examinations, surveys, and contingencies of rivers and harbors, and request for allotment, if needed, will receive consideration.

By command of the Chief of Engineers:

E. N. Johnston,
Captain, Corps of Engineers.

To be returned through the division engineer.

[Fifth indorsement.]

United States Engineer Office,
Dallas, Tex., June 2, 1911.

1. Respectfully returned to the Chief of Engineers, United States Army, through the division engineer, Gulf Division.

2. It is estimated that this survey can be completed and the map prepared for $1,300, and it is requested that that amount be allotted for this purpose from the appropriation for examinations, surveys, and contingencies of rivers and harbors.

3. It is proposed, in order to economize in the completion of this survey, to do the field work upon the completion of the survey which it is expected will be begun on the Neches River in the near future. This will obviate the necessity of putting a special party in the field, and will also permit the work to be done by the junior engineer who made the remainder of the survey.

T. H. Jackson,
Captain, Corps of Engineers.

[Sixth indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., June 5, 1911.

Respectfully returned to the Chief of Engineers, United States Army, with recommendation for approval.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

[For Report of the Board of Engineers for Rivers and Harbors see page 2.]

SURVEY OF SULPHUR RIVER, TEX. AND ARK., FROM MILE 126½ T THE FORKS IN DELTA COUNTY, TEX.

UNITED STATES ENGINEER OFFICE,
Dallas, Tex., January 30, 1912.

SIR: 1. I have the honor to submit the following report on survey of Sulphur River from mile 126½ to the Forks in Delta County, Tex. (mile 194½), made in accordance with fourth indorsement dated Office of the Chief of Engineers, Washington, May 24, 1911, on report submitted by Capt. A. E. Waldron, Corps of Engineers, September 22, 1910, on survey of Sulphur River from its mouth to mile 126½.

2. This survey was made under the direction of Mr. T. B. Warde junior engineer. The party was put in the field on October 25, 1911. the field work was completed on December 2, 1911, and the map completed on January 10, 1912.

3. The map of this survey has been made in six sheets[1] and with a new index sheet showing the entire survey from the mouth of the river to the Forks in Delta County, Tex., and is forwarded herewith. It is recommended that these sheets be combined with the map of the survey from the mouth of the river to mile 126½ made in 1910 under the direction of Capt. A. E. Waldron, Corps of Engineers.

4. The survey was made at extreme low water stage, the water surface varying from about 2 feet to 60 feet in width. The discharge at mile 126½ was estimated at approximately 5 cubic feet per second. This flow decreased as the forks were approached, and a few hundred feet above both the north and south branches there was no flow.

5. The banks of the river in the section covered by this stretch are stable and show little signs of erosion. They are from 20 to 30 feet in height, and are covered with a heavy growth of hardwood timber.

6. The flood channel has a width of from 100 feet to 200 feet, and the flood stage is approximately 25 feet above the low water stage.

7. An inspection was made by me of the river between miles about 17 and 35 on January 18–19, 1912. The general conditions in that stretch were found to be approximately as indicated in the report of Capt. Waldron.

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[1] Not printed.

8. In my opinion this river is not susceptible to improvement for navigation above mile about 50 by any method on account of its insufficient low water discharge. Between its mouth and mile about 60 the river is susceptible to reasonable improvement, provided a lock and dam is placed near its mouth, thus providing slack-water navigation for about 60 miles.

9. The work of improvement for navigation to date has resulted in considerable improvement to the navigation and drainage conditions. The problem of this river, however, is one of drainage, not of navigation, and any work of improvement other than along the lines of improvement for open-river navigation will be to the detriment of the river as a drainage channel. For this reason any improvement contemplating the use of a lock and dam is undesirable.

10. At present there is no navigation on Sulphur River. To date, the only use made of the river for commercial purposes has been the rafting of logs.

11. It is not considered advisable to improve any tributary of Red River where no navigation exists on such tributary, and where no navigation exists on Red River below the mouth of such tributary. In view of the fact that there is at present no navigation on Sulphur River and none expected in the near future, it is considered that further improvement of this river is not justified, and no estimate is submitted.

12. There are no sites on the portion of the river covered by this survey at which water-power plants could be installed.

13. There are no wharf facilities for commercial purposes along the portion of the river covered by this survey, or any points favorable to their location.

14. In view of the above statements, it is recommended that no further improvement of this river be made at this time.

Respectfully submitted.

T. H. JACKSON,
Captain, Corps of Engineers.

The CHIEF OF ENGINEERS, UNITED STATES ARMY
(Through the Division Engineer).

[First indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
New Orleans, La., February 2, 1912.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the opinion of the district engineer that the locality is not worthy of improvement.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

SUPPLEMENTAL REPORT ON SURVEY OF SULPHUR RIVER, TEX. ARK.

UNITED STATES ENGINEER OFFICE,
Dallas, Tex., November 22, 1912.

From: Maj. T. H. Jackson, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Supplemental report on survey of Sulphur River, Tex. Ark.

1. The following report and estimate are submitted in compl with first indorsement, dated Office of the Chief of Engineers, Se tember 23, 1912.

2. The high-water period in Sulphur River is March, April, M and June. The low-water season is September, October, and Nove ber. The following tables give mean readings at all of the gauge or in the vicinity of, Sulphur River of which this office has any reco

Mean gauge readings of Red River at Springbank, Ark. (1 mile below the mouth of Sulphur River).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-age.
1909	5.7	8.4	10.6	7.1	6.7	13.1	6.5	1.2	3.8	−0.1	1.5	10.1	[illegible]
1910	6.8	3.3	7.5	16.0	8.8	5.7	3.9	3.8	.9	− .2	− .8	− .9	[illegible]
1911	.2	3.1	4.3	11.7	8.1	2.4	2.9	4.3	7.5	.7	− .2	5.6	[illegible]
1912	7.0	3.5	15.0	24.5	15.5	7.3	5.5	5.9	2.6	......	......	......	[illegible]
Average	4.9	4.6	9.4	14.8	9.8	7.1	4.7	3.8	3.7	.1	.2	4.9	[illegible]

Mean gauge readings of Sulphur River at Sulphur Station, Tex. (mile 30).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-age.
1909	......	......	......	......	......	......	2.1	1.5	1.1	1.3	1.8	4.6	[illegible]
1910	6.4	2.9	9.4	......	......	......	......	......	......	......	......	......	

Mean gauge readings of Sulphur River at Finlay, Tex. (mile 105).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-age.
1910	4.5	2.0	6.2	11.8	3.5	2.0	2.3	0.3	0.0	0.0	0.0	0.2	[illegible]
1911	1.5	2.5	2.1	10.4	4.8	.6	.5	.6	1.4	1.0	.0	2.1	2.4
1912	2.2	1.4	10.4	21.6	7.4	2.4	3.0	6.8	1.0	......	......	......	[illegible]
Average	2.7	2.0	6.2	14.6	5.2	2.7	1.9	2.6	.8	.5	.0	1.2	3.5

Mean gauge readings of Sulphur River at Ringo Crossing, Tex. (mile 193).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Aver-age.
1910	0.7	1.3	1.9	4.5	2.8	2.8	1.6	0.1	0.0	0.0	0.0	0.0	[illegible]
1911	.0	2.4	.1	3.9	3.7	.9	.7	1.0	.6	.9	.03	2.4	[illegible]
1912	1.4	1.2	6.5	11.8	.8	1.7	1.9	4.0	.4	......	......	......	[illegible]
Average	.7	1.6	2.8	6.7	2.1	1.8	1.4	1.7	.3	.4	.0	1.2	[illegible]

3. From the compiled readings of the above-mentioned gauges the following tables have been prepared:

Gauge readings of Red River at Springbank, Ark. (1 mile below the mouth of the Sulphur River).

Year.	Number of days gauge read at or above—													
	25 feet.		20 feet.		15 feet.		10 feet.		5 feet.		0 feet.		Maximum stage.	Minimum stage.
	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.		
1909	0	0	0	0	23	5	77	8	203	5	330	5	17.0	−0.6
1910	0	0	11	2	22	2	49	4	137	6	280	2	21.8	−1.2
1911	0	0	8	1	19	3	48	6	122	7	297	5	21.9	− .8
1912. Jan.–Oct	16	1	33	3	73	4	110	7	164	6	274	1	28.6	.7
Average for 3¾ years	4	0.26	14	1.6	36	3.7	102	6.6	167	6.4	315	3.5	22.2	− .5

Gauge located on Red River 1 mile below mouth of Sulphur River.
Gauge established by Weather Bureau Jan. 1, 1909.
Zero of gauge not known.

Gauge readings of Sulphur River at Sulphur Station, Tex. (mile 30).

Year.	Number of days gauge read at or above—													
	25 feet.		20 feet.		15 feet.		10 feet.		5 feet.		0 feet.		Maximum stage.	Minimum stage.
	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.		
July 15, 1909–Mar. 9, 1910	0	0	0	0	0	0	0	0	50	3	237	1	8.7	1.1

Average, 2.9 feet.
Gauge established by United States Engineer Department June 15, 1909. Discontinued Mar. 9, 1910.
Location, mile 30.

Gauge readings of Sulphur River at Finley, Tex. (mile 105).

Year.	Number of days gauge read at or above—													
	25 feet.		20 feet.		15 feet.		10 feet.		5 feet.		0 feet.		Maximum stage.	Minimum stage.
	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.		
1910	0	0	6	1	16	3	33	3	59	8	365	1	21.8	0.0
1911	0	0	7	1	13	1	18	2	46	8	365	1	22.9	.0
1912, Jan.–Sept., inclusive	0	0	33	2	44	2	68	5	101	9	274	1	24.6	− .1
Average	0	0	15.3	1.3	24.3	2	39.7	3.3	68.7	8.3	334.6	1	23.1	−.03

Average for year—	Feet.
1910	2.7
1911	2.4
January–September, 1912	6.0
Average	3.5

Gauge established by Weather Bureau Jan. 1, 1910.
Location, mile 105.
Zero of gauge, 240.912 Cairo datum.
Remarks: 1910 gauge read zero 100 days. Average, Aug. 1–Dec. 28, 0.08 feet. 1911 gauge read zero 60 days

Gauge readings at Ringo Crossing, Tex., Sulphur River (mile 193).

Year.	Number of days gauge read at or above—												Maximum stage.	Minimum stage.
	25 feet.		20 feet.		15 feet.		10 feet.		5 feet.		0 feet.			
	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.	Days.	Periods.		
1910	0	0	0	0	0	0	2	2	14	6	365	1	10.5	0.0
1911	0	0	0	0	0	0	4	2	22	5	365	1	14.0	.0
1912, Jan.-Sept., inclusive	0	0	2	1	23	4	33	5	52	7	274	1	20.3	— .0
Average	0	0	0.7	0.4	8.3	1.5	14	3.3	33	6.5	334.6	1	14.9	—.03

Average for year:	Feet.
1910	1.3
1911	1.3
January–September, 1912	3.4
Average, 2¾ years	1.82

Gauge established by Weather Bureau Jan. 1, 1910.
Location, mile 193.
Zero of gauge, 329.131 Cairo datum.
Remarks: 1910, gauge read zero 137 days. Average, Aug. 1–Dec. 31, plus 0.03. 1911, gauge read zero 168 days. 1912, gauge read zero 97 days.

4. There is a fall of about 10.4 feet in the lower 17 miles of Sulphur River. Hence that river is affected by all long rises of Red River above about the 11-foot stage at Springbank, Ark. For this reason, the readings of the Springbank gauge 1 mile below the mouth of the Sulphur River, and about 80 miles above Shreveport, La., are given. This gauge was established by the Weather Bureau, January 1, 1910; hence there has been observation to extend over a limited period. However, comparison of the readings of this gauge with those of the gauge at Shreveport, 80 miles below, shows an extremely close relation.

5. On the accompanying blue print[1] showing the gauge readings at Shreveport for the period 1902–1911, inclusive, there has been interpolated in red, the gauge readings at Springbank for the year 1910. A blue print[1] of the gauge readings at Shreveport for the period 1890–1901, inclusive, is also furnished to permit of general consideration of the water stages of Red River at and above Shreveport.

6. It will be seen that the period of high, mean, and low water stages in Red River are about the same as those in Sulphur River.

7. An examination of the Red River gauge data, the Sulphur River gauge data, combined with an examination of the profile of Sulphur River, shows:

(*a*) Navigation from mile 0 to about mile 17 is impracticable at low and mean water stages, but is practicable at high-water stages for shallow-draft boats.

(*b*) That navigation from about mile 17 to about mile 51 (the limit of practicable operations by quarter boats) is practicable for shallow-draft boats throughout the entire year.

(*c*) That slack-water navigation above mile 51 is impracticable during all except extreme high stages, on account of the limited flow and the steep slopes.

8. The principal industry in this section is farming. The principal crop is cotton. The fruit industry is increasing, and will probably continue to do so. However, it forms but a small portion of the value of the agricultural product.

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[1] Not printed.

9. Cotton is moved principally during the extreme low-water season; that is, during October, November, and December. Fruit is moved during May, June, and July, but as it is small fruit, shipped to northern markets, it is, and will continue to be, handled principally by rail.

10. A limited amount of fertilizer is used in this section. This fertilizer is brought in from Virginia and the Carolinas, principally during the period January to April.

11. The five railroads crossing the Sulphur River are as follows:

Texas, Shreveport & Natchez, mile 6.6.
Kansas City Southern, mile 25.8.
Texas & Pacific, mile 29.7.
Northeast Texas (Munz) Railway, mile 76.8.
St. Louis Southwestern, mile 105.

12. The logical subdivisions of the river, considering railroad crossings and the natural obstructions offered by hogbacks in the lower 17 miles, are as follows:

(*a*) Mouth to mile 17.
(*b*) Mile 17 to about mile 51.
(*c*) Mile 51 to the Northeast Texas (Munz) Railway, mile 77.
(*d*) Mile 77 to the St. Louis Southwestern Railroad crossing, mile 105.
(*e*) Mile 105 to mile 194½ (limit of survey).

13. The river below about mile 51 is in good condition, and needs no work other than maintenance to keep it free from drift and snags, etc. Above mile 51, however, no improvement work has been done, and the river is full of drift, snags, etc. Overhanging trees are found in great numbers, and their removal will be a considerable portion of the cost of clearing the channel for navigation.

14. The following is an estimate of the cost of clearing the river of snags, drift, overhanging trees, and other accidental obstructions, so far as may be necessary to enable the stream to be used at low water, and also at ordinary water stages by boats of as great a draft as permitted by the natural conditions of the stream when free of the above-named obstructions:

Mile 0 to mile 17	0
Mile 17 to mile 51	0
Mile 51 to mile 77, 26 miles, at $800	$20,800
Mile 77 to mile 105, 28 miles, at $700	19,600
Mile 105 to mile 194½, 89½ miles, at $550	49,600
Total	90,000

15. The annual cost of maintaining this channel when once free from the above-mentioned obstructions is estimated as follows:

Mile 0 to mile 17, 17 miles, at $100	$1,700
Mile 17 to mile 51, 34 miles, at $100	3,400
Mile 51 to mile 77, 26 miles, at $150	3,900
Mile 77 to mile 105, 28 miles, at $150	4,200
Mile 105 to mile 194½, 89½ miles, at $100	8,800
Total	22,000

T. H. Jackson.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, GULF DIVISION,
Baltimore, Md., December 12, 1912.

To the CHIEF OF ENGINEERS:

1. Forwarded.

2. The only comment which the division engineer makes upon this report is that the annual cost of maintenance, such as is given by the district officer in paragraph 15, does not, in a stream of this character, become applicable upon the first removal of snags, overhanging trees, and similar timber obstructions. But until the banks are so cleared of timber that there is not a constant yearly addition to these obstructions, and the upper waters are practically clear of timber which will drift into the lower reaches, the cost will for several years approach more nearly that of doing the work in the first place, such as is stated in paragraph 14, than of maintenance as given in paragraph 15.

3. The district officer's statement in paragraph 15 is believed to be approximately correct, but it is considered advisable to invite attention to the expression "when once free," which condition may not exist for many years.

LANSING H. BEACH,
Lieut. Col., Corps of Engineers,
Division Engineer.

O

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1436.

SALEM RIVER, N. J.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON EXAMINATION AND SURVEY OF SALEM RIVER, N. J., WITH A VIEW TO THE CONSTRUCTION OF A CUT-OFF AT THE MOUTH.

FEBRUARY 27, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 24, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 21st instant, together with copies of reports from Maj. R. R. Raymond, Corps of Engineers, dated September 13 and December 28, 1912, with map, on preliminary examination and survey, respectively, of Salem River, N. J., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 21, 1913.

From: The Chief of Engineers.
To: The Secretary of War.
Subject: Report on examination and survey of Salem River, N. J.

1. There are submitted herewith, for transmission to Congress, reports dated September 13 and December 28, 1912, with map, by

Maj. R. R. Raymond, Corps of Engineers, on preliminary examination and survey, respectively, of Salem River, N. J., with a view to the construction of a cut-off at the mouth, called for by the river and harbor act approved July 25, 1912.

2. Salem River is a tidal stream emptying into Delaware River through Salem Cove, which is an indentation in the eastern shore of Delaware River. The head of navigation for the city of Salem is a covered fixed bridge on the Little Salem River. The maximum draft at mean low water is 9 feet to Salem.

3. The existing project for the improvement of Salem River provides for dredging a channel below Salem 9 feet deep and 100 feet wide, amplifying at the bends. Local interests now desire the United States to make a cut-off to eliminate a bend below the city, with a view to shortening the distance to Delaware River, and enabling the city to increase its water front on the main river. The proposed improvement is estimated by the district officer to cost $35,000. He is unable to see that its construction would benefit general navigation to an extent which would warrant this expenditure, and therefore does not recommend the improvement. The division engineer concurs with the views of the district officer.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of February 3, 1913, concurring with the district officer and the division engineer. In connection with its study of this matter, the board held a public hearing at its office on January 21, 1913, and has given consideration to a number of written statements filed by interested parties.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Salem River, N. J., with a view to the construction of a cut-off at the mouth, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time at the expense of the Federal Government, although there appears to be no objection to its construction at local expense as a desirable preliminary to a terminal development project probably quite advantageous to the adjoining city and to other local interests.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
February 3, 1913.

To the Chief of Engineers, United States Army:

1. The existing project for the improvement of Salem River provides for dredging a channel below Salem 9 feet deep at mean low water and 100 feet wide, amplifying at the bends. The project covers a distance of about 3½ miles, and is reported as completed with the exception of the stony bar at the bend above the brickyard. The

range of tide is about 6 feet. The total amount expended by the United States on the river is about $73,000.

2. The improvement now desired is the cutting of a channel across a long bend just below the town of Salem. This bend is 10,700 feet around, while across the neck the distance is 3,400 feet.

3. Salem is a manufacturing city. and has a miscellaneous water-borne commerce, reported for the calendar year 1911 as amounting to 144,545 tons, valued at over $10,000,000.

4. The results of the preliminary examination indicated that the cut-off would advantageously shorten the channel, reduce the cost of maintenance, and materially benefit the city of Salem by affording needed room for additional wharves and factory sites. The board therefore recommended a survey, stating that the advisability of the improvement depended upon the cost of the work proposed, the saving that would be effected in maintenance, and the extent of cooperation which might be expected from the locality.

5. A survey having been made, the district officer reports that a channel 9 feet deep at mean low water and 100 feet wide on the bottom across the neck will cost $35,000, while the removal of the few shoals existing in the bend of the river will cost $2,000. With reference to the question of maintenance, the district officer states that both the cut-off and the bend are expected to be practically self-maintaining, the advantage, if any, being slightly in favor of the cut-off. The district officer states that assurances have been given that the necessary land will be donated free of cost to the United States. In view of the large cost of the cut-off as compared with the improvement of the natural channel around the bend and that the benefits to general navigation will be measured by the elimination of about 2 miles of excellent channel, the district officer states that he can not favorably recommend the undertaking of the work.

6. As a result of the district officer's notification of his unfavorable report, a hearing was given interested parties by the board on January 21, 1913, which was attended by Hon. William J. Browning, M. C., and a delegation of citizens from the locality. Much interest was displayed in the subject, several of those present addressed the board, and a number of letters and resolutions were presented. Among other things, it was stated that the cut-off would result in the saving of from 15 to 20 minutes on each boat trip, that the district officer's estimates were larger than necessary for the cut-off and not large enough for the natural channel, that cut-offs have been made elsewhere in similar cases, and that the channel in the bend was too narrow for the steamboat navigating the stream.

7. The board recognizes that the improvement would be of some value to the steamboat service, but believes that the greatest benefit would be to the city of Salem as a municipal improvement. The cooperation offered by the locality is to give the necessary right of way and a place for the deposit of dredged material without cost to the United States. The small saving in time to be effected by the improvement does not appear to be a matter of great importance; there is no reason to doubt the material accuracy of the district officer's figures as to the cost of the improvement; no material saving in maintenance is to be expected from the construction of the cut-off; and the existing project, which is not wholly completed, authorizes such widening of the channel at the bends as may be necessary. The cooperation offered by the municipality is not sufficient to materially reduce the cost of the

improvement to the United States. After due consideration, therefore, the board has reached the conclusion that the benefits to be expected from the cut-off to general commerce and navigation are not sufficient to justify the expense involved, and therefore it concurs with the district officer and the division engineer in the opinion that it is not advisable at this time for the United States to undertake the improvement of Salem River by making the cut-off referred to in the act.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be coordinated with the project proposed in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF SALEM RIVER, N. J.

Engineer Office, United States Army,
Wilmington, Del., September 13, 1912.

From: Engineer Officer, United States Army, Wilmington, Del.
To: The Chief of Engineers, United States Army
(Through Division Engineer).
Subject: Preliminary examination of Salem River, N. J.

1. In compliance with department letter of August 3, 1912, the following report is submitted under the provisions of the river and harbor act of July 25, 1912, as follows: Salem River, N. J., with a view to the construction of a cut-off at the mouth.

2. The examination was made by me and also by Mr. George W. T. Miller, assistant engineer, under my direction, from whose report the following is largely quoted.

3. Salem River is a tidal stream, emptying into the Delaware River through Salem Cove, which is an indentation in the eastern shore of the Delaware River, extending from Fort Mott on the north to Elsinboro Point, abreast of Reedy Island Quarantine Station, on the south.

4. The head of navigation for the city of Salem is a covered fixed bridge on Little Salem River or Fenwick Creek. From this bridge down to the junction of Little Salem and Salem Rivers is about 3,600 feet. About 450 feet below the confluence is a draw highway bridge. About 1,500 feet farther downstream, at a sharp turn called Devils Reach, is located the lowermost wharf of the town, at the foot of Broadway. This gives the city of Salem a water front at present of a little over a mile along the left bank of the two streams.

5. From the turn called Devils Reach the course of the river swings in a wide, sweeping horseshoe, about 10,700 feet, to a small settlement called Sinnicksons Landing. The tract of land between Sinnicksons Landing and Devils Reach, encircled by the horseshoe sweep of the river, is low-lying marsh, at one time reclaimed and cultivated, but now, by reason of the protecting tide banks having been breached in many places, is a waste out to the tide. Its elevation is somewhat lower than high tide. A cut-off connecting the two ends of this horseshoe and eliminating the 2 miles of bend is what is desired by parties interested in the improvement.

6. The stream was first examined in 1870 and a project for improvement submitted the same year. By various appropriations up to 1880 a channel was dredged to a depth of 8 feet and a width of 110 feet. In 1884 another examination was made. The conclusion then reached was that the demands of commerce did not warrant the cost of necessary permanent protective works (estimated at $336,000) and that, when needed, temporary relief could be given by dredging.

7. In 1894 another preliminary examination was made (report printed in H. Ex. Doc. No. 34, 53d Cong., 3d sess.). In 1897 the survey was made and a project with estimate of cost submitted (report printed in H. Ex. Doc. No. 78, 55th Cong., 1st sess.). This project provided for a channel, by dredging, 100 feet wide and 9 feet deep, with widening at bends, from the Delaware River to the fixed bridge across Little Salem River and the removal of some stony bars in front of the city wharves and at the bend above the brickyard, at an estimated cost of $31,500.

8. Nothing further was done until 1907, when an estimate of cost under existing conditions was called for (report printed in River and Harbor Committee Doc. No. 12, 59th Cong., 2d sess.). The estimate of cost therein was $29,000 for the improvement and $5,000 for annual cost of maintenance. The river and harbor act of March 2, 1907, appropriated $29,000 for the completion of the improvement. A subsequent examination showed that the project could not be completed for that amount and the estimate was increased to $38,600.

9. The river and harbor act of March 3, 1909, again called for a preliminary examination (report printed in H. Doc. No. 318, 61st Cong., 2d sess.). The conclusions of this report were that the project of 1907, with the maintenance thereof, upon completion, amply provided for the commerce of the river.

10. With the appropriations of 1907, 1909, 1910, and 1911, amounting to $56,600, the improvement has been carried on and maintained, and the channel has been dredged to project dimensions throughout except for a short distance at the upper end of Little Salem River, where, owing to the narrowness of the river bed and its soft mud banks, the channel was reduced to a minimum width of 80 feet and gradually expanded to the project width of 100 feet. The maximum draft that could be carried on June 30, 1912, over the shoalest part of the river was 9 feet. The range of the tide is 6 feet at the mouth.

11. Salem is a very old town, is the county seat of Salem County, and is the center and distributing point of a rich agricultural and manufacturing region. The Salem branch of the West Jersey & Seashore Railroad (Pennsylvania system) has its southern terminus at Salem and shares with the river the transportation business of the town. Besides, several stage lines use the fine roads radiating from Salem to inland towns. The principal productions of Salem are glass, canned goods, oilcloth, linoleum, and iron and brass castings. There is also located there a large depot for both fuel and illuminating oil. In 1897 the water-borne commerce of Salem was reported to be 36,346 tons, valued at $1,134,700. In 1909 the statistics then collected gave to water transportation 94,600 tons, valued at $3,784,000. For the calendar year 1911, the commerce of the river was reported as 144,545 tons, valued at $10,973,960.

12. Salem is located wholly upon the left bank of Little Salem and Salem Rivers and its waterfront from the fixed bridge to Devils Reach is almost entirely occupied, with no opportunity of extension except

around the bend below Devils Reach, in the quagmire where construction would be very expensive if at all practicable. The right bank of the river is bordered by low-lying meadows, banked in and under cultivation for the most part, but offering no sites for wharves or buildings. Fast land comes down to the river shore in one place along the right bank about midway of the bend it is desired to cut off. This place is occupied by an old farmhouse now used as a clubhouse. Below Devils Reach in a line with Sinnicksons Landing (the line of the desired cut-off), the fast land is closely skirted and the shore of such a cut-off would soon be occupied by wharves and warehouses for which there is now no room.

13. The bend is 10,700 feet around, while across the marsh from low water to low water the distance is 3,400 feet, a saving in distance by way of the cut-off of 7,300 feet. This saving in length of channel would result in a saving in maintenance by the Government, besides being of great advantage to the shipping interests of the river and affording places for wharves which, under existing conditions, are impracticable around the bend.

14. A track from the railroad runs parallel and close to the present waterfront of Salem, affording excellent transfer facilities if needed.

15. The wharves are all privately owned, but are open to the use of anyone for a reasonable wharfage charge.

16. Floods give no trouble and there is no waterpower to utilize.

17. The question as to whether it would be advisable to make the improvement depends upon its cost, which can be ascertained only by a survey. This I strongly recommend, in view of the large commercial interests involved.

18. A map[1] showing the locality is inclosed herewith.

R. R. Raymond,
Major, Corps of Engineers.

[First indorsement.]

United States Engineer Office,
New York City, September 17, 1912.

To the Chief of Engineers, United States Army:

1. Forwarded.

2. If the cut-off proposed will materially lower the cost of maintenance of the present channel as stated in paragraph 13 of this report, it will be worth cutting if not too expensive.

3. I recommend a survey to determine the cost of same.

Wm. T. Rossell,
Colonel, Corps of Engineers,
Division Engineer.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
Washington, October 14, 1912.

To the Chief of Engineers, United States Army:

1. The improvement desired is a cut-off across a large bend in the river near its mouth and just below the city of Salem, with a view to

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[1] Not printed.

shortening the channel, reducing the cost of maintenance, and extending the water frontage of Salem along the edge of the fast land which the cut-off would skirt. It appears, therefore, that the question of advisability depends upon the cost of the work proposed, the saving that would be effected in the maintenance of the channel, and the extent of cooperation which might be expected from the locality. To determine these questions, the board concurs with the district officer and the division engineer in recommending that a survey and estimate of cost be authorized.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF SALEM RIVER, N. J.

ENGINEER OFFICE, UNITED STATES ARMY,
Wilmington, Del., December 28, 1912.

From: Engineer Officer, United States Army.
To: The Chief of Engineers, United States Army.
(Through Division Engineer.)
Subject: Survey of Salem River, N. J.

In compliance with department letter of October 22, 1912, I submit the following report of a survey of Salem River, N. J., made under the provisions of the river and harbor act of July 25, 1912, as follows: Salem River, N. J., with a view to the construction of a cut-off.

The field work was done under the direction of Mr. George W. T. Miller, assistant engineer, by Mr. Wm. E. Snyder, junior engineer (surveyor). Ordinary methods were used, the control being by means of triangulation and the topography by transit and stadia. A copy of Mr. Miller's report is herewith.

Salem has a considerable water-borne commerce, reported as 144,545 tons annually, valued at $10,973,960. Its harbor conditions are peculiar in that Salem River has width and depth ample for its commerce, but the city is situated on the concave bank of a rather short bend, so that the available water front on the main river is only about 500 yards long. Immediately above the drawbridge of the Penns Neck turnpike, the river bends away from the city and lies between low marshy banks unsuitable for development. At the western extremity of the present water front the river turns abruptly northward, so that although fast land extends along the line of the proposed cut-off to Sinnicksons Landing, and this fast land is the actual high-water bank of the river, nevertheless, the city can not use this frontage on account of the great difficulty presented by the marsh which is inclosed in the bend of the river. This marsh would not bear a fill deep enough to make it available, and no structures could be erected upon it without deep pile foundations at a prohibitive cost.

The cut-off presents a solution of the problem possessing the following advantages:

1. It shortens the distance from the city to the Delaware River by more than a mile.
2. It reclaims considerable land.
3. It enables the city to quadruple its water front on the main river.

There can be no doubt that the cut-off would be of great direct benefit to the city and of some benefit to the water-borne commerce, this benefit being direct in shortening the distance to the Delaware River and indirect in providing additional room for development of the wharves with the consequent probable extension of the navigation of the river.

Since one bank of the cut-off is desired to be used for wharf purposes, ample width is required. In my opinion 100 feet is the minimum width that would give a satisfactory channel enabling the largest vessels using the river to pass without danger.

The cost of the cut-off is estimated at $35,000, which should provide a channel 9 feet deep at mean low water and 100 feet wide at the bottom.

The cost of removing the few shoals existing in the bend of the river is estimated at $2,000. This work is estimated at a higher unit price than the cut-off because of the harder dredging and small, scattered quantities. It involves dredging 6,865 cubic yards and includes widening at bends and rectifying the channel slightly at a place where the full width of 100 feet exists, but where navigation is difficult.

Both the cut-off and the bend are expected to be practically self-maintaining, the advantage, if any, being slightly in favor of the cut-off, which may be expected to deepen rather than to shoal.

The difference in cost of construction is $33,000 in favor of the natural river.

No questions of water power or freshets are involved. The question of terminals is the vital point of the problem.

The manufacturing establishments of Salem desire both rail and water shipping facilities, the proposed cut-off being intended to make this arrangement possible. Sixteen existing wharves at Salem have railroad sidings on them or near at hand. There is a strong sentiment in Salem in favor of the cut-off, and assurances have been given that the necessary land will be donated free of cost to the United States.

But in spite of the local desire for the cut-off and its undoubted value to the commerce of Salem, I am unable to see that its construction will benefit the navigation of the Nation at large to an extent greater than is represented by the elimination of about 2 miles of excellent channel. I can see no objection to the construction of the cut-off, and there are advantages to be expected from it, but the cost of construction seems so great as compared with the benefits to the whole nation, that I can not favorably recommend the undertaking of the work as a national necessity.

R. R. RAYMOND,
Major, Corps of Engineers.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
New York City, January 8, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

Forwarded, concurring in the views and recommendation of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

[For report of the Board of Engineers for Rivers and Harbors on survey, see page 2.]

REPORT OF ASSISTANT ENGINEER GEORGE W. T. MILLER ON SURVEY OF SALEM RIVER, N. J.

WILMINGTON, DEL., *December 24, 1912.*

MAJOR: I have the honor to report upon the survey of Salem River, N. J., which was ordered to be made upon the approval of the report upon the preliminary examination made to comply with the provisions of the river and harbor act of July 25, 1912: Salem River, N. J., with a view to the construction of a cut-off at the mouth.

The survey, which was made by Mr. Wm. E. Snyder, junior engineer (surveyor), extended from Penns Neck Bridge downstream, around the bend it is desired to have cut off, to Sinnicksons Landing, a small settlement of summer cottagers, at the lower end of the proposed cut-off. A tide gauge was established at Penns Neck Bridge and was read while the field work of the survey was in progress. The mean range of tide is 6 feet.

The proposed cut-off starts, at the upstream end, just below the lower steamboat wharf of Salem and cuts in a straight line across the marsh, whose elevation is about 4½ feet above mean low water, and touching and cutting through the tip of a tongue of sandy land whose elevation is 7½ feet above mean low water, to rejoin the river at Sinnicksons Landing. The material to be encountered in making the cut-off will be largely marsh mud, with some sand and a small proportion of gravel and clay.

Positive assurance has been given that the land necessary for the cut-off will be given free of cost to the United States. There is ample area for the disposal of the dredged material along the sides of the cut-off, and so disposed it will serve the added purpose of reclaiming what is now practically worthless land periodically submerged by the tide, in large part.

The principal reason for the cut-off is as a time saver. No argument can be brought forth that the cut-off will result in economy in maintenance; the bend to be cut off requires very little work upon it to give it throughout the project dimensions; throughout most of its length the channel dimensions far exceed those called for by the project for improving Salem River. On the other hand, it is fully expected that the cut-off will require very little, if any, work of maintenance.

An additional and very strong reason for the cut-off is that Salem's available water front is now entirely occupied, both on Big Salem and Little Salem Rivers. The city is growing rapidly in manufacturing and other industries benefited by water transportation, and in a very short time after the cut-off is made every foot of its southern bank will probably be occupied by wharves. The additional business, originating at these new wharves, will amount to many times over the cost of the cut-off, besides the benefit existing commerce and its natural growth will derive from the reduction in time of trips.

The length of the cut-off from 9-foot curve to 9-foot curve is 4,100 feet; the length of the bend cut out 10,660 feet, measured from common points, thus effecting a saving of 6,560 feet, considerably over a mile.

To dredge the cut-off 9 feet deep and 75 feet wide on the bottom, with allowance for 1 foot overdepth and side slopes of one on one, will require the excavation of 174,165 cubic yards of material, place measure.

To give the cut-off a bottom width of 100 feet will require the excavation of 232,500 cubic yards.

It is advisable, even necessary, to give the cut-off the greater width (100 feet), as the principal boat engaged in the transportation business on the Salem River has a draft of 8 feet and a beam of 52 feet. In anything less than a width of 100 feet such a boat would be unmanageable. As the cut-off is perfectly straight, the boat's length does not enter into the problem.

Owing to the presence of the sand, gravel, and clay in the excavation the unit price will probably be a little higher than for mud alone.

Estimate.

Dredging 232,500 cubic yards of material, at 13½ cents	$31,387.50
Add for engineering and contingencies	3,612.50
Total	35,000.00

The commerce of Salem River was reported to amount to 144,545 tons, valued at $10,973,960, for the calendar year 1911. The cost of the desired improvement amounts to a little over three-tenths of 1 per cent of the business reported.

No additional facts relating to the commerce of the river or other conditions, other than the physical conditions centering about the locality of the proposed cut-off, were learned during the survey, beyond those given in my report[1] on the preliminary examination dated September 9, 1910, to which I respectfully refer.

Very respectfully, your obedient servant,

George W. T. Miller,
Assistant Engineer.

Maj. R. R. Raymond,
Corps of Engineers.

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[1] Not printed, but largely quoted in report of Major Raymond, dated September 13, 1912, on preliminary examination.

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NEW JERSEY.

PROPOSED CUT-OFF

Scale of feet

House Doc. No. 1436; 62d Cong., 3d Sess.

62D CONGRESS, 3d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1437.

BIG MARCO PASS AND HARBOR AT MARCO, FLA.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF BIG MARCO PASS AND HARBOR AT MARCO, FLA.

FEBRUARY 27, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

WAR DEPARTMENT,
Washington, February 26, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 25th instant, together with copy of a report from Capt. J. R. Slattery, Corps of Engineers, dated December 18, 1912, on preliminary examination of Big Marco Pass and Harbor at Marco, Fla., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 25, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Big Marco Pass and Harbor at Marco, Fla.

1. There is submitted herewith, for transmission to Congress, report dated December 18, 1912, by Capt. J. R. Slattery, Corps of

Engineers, on preliminary examination of Big Marco Pass and Harbor at Marco, Fla., called for by the river and harbor act approved July 25, 1912.

2. Big Marco Pass, which forms the outlet of Big Marco River into the Gulf, lies on the west coast of Florida about 113 miles south of the entrance to Tampa Bay. The pass is obstructed by a bar, over which there is at the present time but little more than 6 feet of water. Inside the bar there are available depths of 20 feet or more in Big Marco River, practically up to Marco, but vessels drawing more than 4 or 5 feet can not enter. The district officer states that residents of Marco desire that a channel 10 feet deep be secured through the bar, which would require dredging over about a mile length of channel which would probably fill up again quickly unless protected by expensive jetties. The average tidal fluctuation is about 2 feet.

3. Marco is a small village, the principal industry of which consists in canning clams and fish. The commerce of the locality is reported to amount to about 2,250 tons annually, valued at $113,661, all of which is necessarily handled by water, as the nearest railroad is 60 miles distant. Several small boats now use the harbor and a channel 10 feet deep would enable a good-sized steamer to enter. In order to maintain a deeper channel through the bar, the district officer believes that it would be necessary to construct double jetties, the cost of which would be prohibitive. On account of the small commerce involved and the probable large cost of a suitable improvement, he is of opinion that the locality is not worthy of improvement by the United States at the present time. The division engineer concurs in this opinion.

4. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 21, 1913, concurring with the views of the district officer and the division engineer.

5. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Big Marco Pass and Harbor at Marco, Fla., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 21, 1913.

The Chief of Engineers, United States Army:

1. Big Marco Pass lies on the west coast of Florida about 53 miles south of the entrance to Charlotte Harbor. The pass is obstructed by a bar over which there is at the present time but little more than

6 feet of water. Inside the bar there are depths of 20 feet or more in Big Marco River practically up to the village of Marco. The condition of the bar limits navigation to boats drawing 4 or 5 feet. The average tidal fluctuation is about 2 feet.

2. Marco is a small village credited with a population of 115 in the census of 1910. The principal industry consists in canning clams and fish. The amount of commerce is stated to be about 2,250 tons, having a value of $113,661. As this locality is 60 miles from a railroad, it is dependent upon water transportation.

3. The improvement desired is a channel 10 feet deep and at least 200 feet wide through the bar. The district officer states that the maintenance of a channel at this locality would necessitate its protection by twin jetties, and that the cost of such work would be prohibitive. He regards the locality as unworthy of improvement by the United States, in which view the division engineer concurs.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. In view of the small existing commerce, the improbability of any material increase, the limited number of people to be affected by the improvement, the sparsely settled country adjacent, the shifting character of the bar, and the great expense that would have to be incurred for its improvement, the board concurs with the district officer and the division engineer and reports that in its opinion it is not advisable for the United States to undertake the improvement of Big Marco Pass at this time.

6. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF BIG MARCO PASS AND HARBOR AT MARCO, FLA.

War Department,
United States Engineer Office,
Jacksonville, Fla., December 18, 1912.

From: Capt. J. R. Slattery, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Big Marco Pass and Harbor, at Marco, Fla.

1. In compliance with department letter dated August 3, 1912, I submit the following report on the preliminary examination of Big Marco Pass and Harbor, Fla., authorized by the river and harbor act approved July 25, 1912.

2. Big Marco Pass lies on the west coast of Florida about 113 miles south of the entrance to Tampa Bay and 53 miles south of the entrance to Charlotte Harbor. It forms the outlet of Big Marco River

into the Gulf. The pass is obstructed by a bar over which there is at the present time but little more than 6 feet of water. It is stated by local residents that in 1873 a storm washed a channel through this bar 12 feet deep, which remained open for 20 years. The center of this channel was on the established ranges. The channel across the bar is not fixed in location but goes through a regular cycle of changes; starting at the extreme northern location it shifts gradually southward, under the influence of littoral drift, until it finally breaks through the shoal again at a point near the old northern location. Once inside the bar. there are available depths of 20 feet or more in Big Marco River practically up to Marco. The bar, however, makes it impossible for boats drawing more than 4 or 5 feet to enter, and in rough weather even such boats can not cross the bar.

3. The average tidal fluctuation is about 2 feet.

4. No previous examination or survey has been made of this locality.

5. Residents of Marco desire that a 10-foot channel should be secured through the bar.

6. Marco is a small village. The principal industry of the town consists in canning clams and fish. The clam-canning factory has a capacity of 250 to 300 bushels per day, and represents an outlay of $12,000. There are two small hotels in the village which in winter are patronized to some extent by tourists. It is stated that formerly when a deep channel existed across the bar, many pleasure boats stopped here. There is one good-sized store doing a general merchandise business said to amount to $5,000 per month. There is one marine railway and shipyard in the town, capable of handling 60-foot boats, which formerly built many of the schooners engaged in sponge fishing about Key West.

7. The soil about Marco is a rich vegetable loam, said to be well adapted to raising tomatoes and garden truck. The country is low and swampy in many places, and is bordered to the northward by a branch of the Big Cypress Swamp, in which there is said to be a great amount of valuable cypress.

8. It is 60 miles from Marco to the nearest railroad, and all supplies for Marco, as well as all produce from Marco and the surrounding country, are handled by water. A 10-foot channel across the bar would enable the steamer *Mildred*, of the Towles Line, which plies between Tampa, Fort Myers, and Key West, to enter. The *Mildred* is a good-sized ship, and if she could enter this harbor, the transportation facilities of Marco would be vastly improved.

9. The commerce of this locality is about as follows:

	Tons.
Building material	100
Fertilizers	50
Fish	750
Flour	60
Gasoline	175
Grain	175
Fruit	235
Groceries	60
Dry goods, etc	4
Ice	450
Lime	4
Miscellaneous	187
	2,250

Value of commerce, $113,661.

10. The following table gives the boats now using this harbor and the ports to which they sail:

Name of boat.	Port to which it sails.	Tonnage.	Trips per week.
Roamer	Punta Gorda	35	2
Harris Bros	do	22	2
E. C. Knight	do	12	2
Ethel L	Fort Myers	16	1
Eureka	Tampa	22	1
Claire	Key West	14	1
Decoy	Punta Rassa	15	3

11. The only thing in the nature of terminal facilities is the pier at Marco, which is free to all boats desiring to use it. There is no railroad within 60 miles of Marco.

12. In order to maintain a deeper channel through the bar it would probably be necessary to protect it by double jetties. The cost of such work would be prohibitive. The locality is not worthy of improvement by the United States at the present time.

13. Notice of adverse report has been sent to the persons whose names appear on the following list.[1] A copy [1] of notice is also inclosed herewith.

J. R. SLATTERY.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, SOUTHEAST DIVISION,
December 26, 1912.

The CHIEF OF ENGINEERS:

I agree with the district officer that Big Marco Pass and Harbor is not worthy of improvement by the United States at this time.

DAN C. KINGMAN,
Colonel, Corps of Engineers.

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[1] Not printed.

62d Congress, 3d Session. } HOUSE OF REPRESENTATIVES. { Document No. 1439.

CABIN BRANCH AND CURTIS CREEK, MD.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON EXAMINATION OF CABIN BRANCH AND CURTIS CREEK, MD., TO CONNECT WITH THE MAIN CHANNEL FROM THE PATAPSCO RIVER TO THE PIER OF THE BALTIMORE & OHIO RAILROAD.

February 28, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, February 26, 1913.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 24th instant, together with copy of a report from Lieut. Col. L. H. Beach, Corps of Engineers, dated December 12, 1912, on preliminary examination of Cabin Branch and Curtis Creek, Md., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

Henry L. Stimson,
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, February 24, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of Cabin Branch and Curtis Creek, Md.

1. There is submitted herewith, for transmission to Congress, report dated December 12, 1912, by Lieut. Col. L. H. Beach, Corps

of Engineers, on preliminary examination of Cabin Branch and Curtis Creek, Md., to connect with the main channel from the Patapsco River to the pier of the Baltimore & Ohio Railroad, called for by the river and harbor act approved July 25, 1912.

2. Cabin Branch is a tributary of Curtis Creek, which it enters from the southwest at a point about one-half mile above the head of the Government channel in Curtis bay. The westerly side of Curtis Creek and the northerly side of Cabin Branch are occupied by several manufacturing plants, and the improvement desired is stated to be a channel 25 feet deep from the channel in Curtis Bay to a point near the bridge over Cabin Branch. The district officer reports that the dredging necessary to give this depth in front of the wharves referred to would be more in the nature of a private benefit than a public improvement. He therefore expresses the opinion, in which the division engineer concurs, that Cabin Branch and Curtis Creek are not at this time worthy of improvement by the United States.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of January 20, 1913, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of Cabin Branch and Curtis Creek, Md., to connect with the main channel from the Patapsco River to the pier of the Baltimore & Ohio Railroad, in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. Bixby,
Chief of Engineers, U. S. Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
January 20, 1913.

The Chief of Engineers, United States Army:

1. This waterway is an estuary of Curtis Bay, an arm of Patapsco River. A number of important industries are located upon the west bank of Cabin Branch, and the improvement desired is a channel 25 feet deep extending up to these industries.

2. The district officer states that the Coast and Geodetic Survey charts show a good 25-foot depth from the 30-foot Government channel in Curtis Bay along the easterly side of the creek to a point opposite Cabin Branch, but that this depth is on the opposite side of the stream from the plants desiring to use it. Beyond this the depth shoals to 18 feet at a point about one-eighth of a mile inside the branch, from whence it shoals to 14 feet at the bridge crossing about one-half mile above its mouth.

3. The commerce of this waterway is considerable. The district officer states, however, that as a channel of the desired depth already exists, dredging to carry this depth to the wharves would be more in the nature of a private benefit than a public improvement. Therefore he reports the locality as unworthy of improvement by the United States, in which view the division engineer concurs.

4. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of submitting their views to the board, but no communications on this subject have been received.

5. From the facts presented it appears there is a natural depth of 25 feet in the lower part of Curtis Creek up to the mouth of Cabin Branch, and of not less than 18 feet for a short distance up the branch to a point quite near the industrial plants making use of this waterway. The board agrees with the district officer and the division engineer that connecting or auxiliary channels to the plants or wharves would be for private benefit and that they should be furnished by those concerned. It reports, therefore, that it is not advisable at this time for the General Government to undertake the improvement of Cabin Branch and Curtis Creek, Md.

6. In compliance with law, the board reports that there are no questions of terminal facilities, waterpower, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF CABIN BRANCH AND CURTIS CREEK, MD.

United States Engineer Office,
Baltimore, Md., December 12, 1912.

From: Lieut. Col. Lansing H. Beach, Corps of Engineers.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Cabin Branch and Curtis Creek, Md.

1. In compliance with department letter of August 5, 1912, the following report is submitted on the preliminary examination of Cabin Branch and Curtis Creek, Md., to connect with the main channel from the Patapsco River to the pier of the Baltimore & Ohio Railroad, as provided for in the river and harbor act of July 25, 1912.

2. Curtis Creek is a tributary of the Patapsco River, into which it empties on the west side at a point 3½ miles below the corporate limits of Baltimore city. The lowest mile of the creek widens considerably and is known as Curtis Bay. It is navigable for small boats for a distance of 7 miles from the main ship channel in the Patapsco River. The industrial settlements of South Baltimore and Curtis Bay are upon the west side. Harbor lines have been established on both sides of the creek.

3. The navigable portion of Cabin Branch forms an estuary of Curtis Creek, entering it from the southwest at a point about one-half mile above the head of the Government channel in Curtis Bay. It has an average width of about three-eighths of a mile, with depths gradually decreasing from 20 feet at its mouth to 7 feet at a point somewhat more than half a mile farther up. The mean range of tide is a little over 1 foot. These waters, while beyond the city limits, are in reality a part of Baltimore Harbor, the commerce being included in that of the port of Baltimore in the annual reports of the Chief of Engineers.

4. There are two piers on the westerly side of Curtis Creek—one at the works of the United States Fertilizer Co. and the other at those of the Atlantic Fertilizer Co. A short distance beyond the ends of these piers there is a depth of 24 feet. The northerly bank of Cabin Branch is occupied by the plant of the Standard Guano Co., that of the Standard Wholesale Phosphate Co., and that of the Monumental Shell Co., the wharf of the last being the farthest upstream at a point a little over a quarter of a mile from Curtis Creek. Harbor lines have been established for a short distance into Cabin Branch.

5. The Coast and Geodetic Survey charts show that there is now a good 25-foot depth from the 30-foot Government channel in Curtis Bay along the easterly side of the creek to a point opposite Cabin Branch and about a quarter of a mile from the entrance, this depth unfortunately being on the opposite side of the stream from the plants desiring to utilize it. Beyond this the depth shoals to 18 feet about an eighth of a mile inside the creek and opposite the wharf of the Standard Guano Co. From here to the bridge mentioned above there is a least depth of 14 feet. No work has been done by the Government in this branch.

6. Those interested in the improvement desire a channel 25 feet deep from the Government channel in Curtis Bay to a point near the bridge over Cabin Branch, and submit the accompanying letter stating the commerce of the locality, to which attention is invited.

7. The Standard Guano Co. has a railroad pier extending into Cabin Branch, for loading directly from the vessel to cars and vice versa. There are piers at the other plants which are private and used exclusively by the owners. There is no need for a public pier.

8. There are no questions of water power, land reclamation, or kindred subjects, that could be considered in connection with any improvement of this waterway.

9. The commerce of the stream is considerable and will probably increase appreciably within the next few years, but owing to the fact that a channel of the depth desired already exists in the stream, the dredging necessary to give this depth in front of the wharves of the plants using the waterway would be more in the nature of a private benefit than a public improvement. This office is therefore forced to report that Cabin Branch and Curtis Creek, Md., are not at this time worthy of improvement by the United States.

10. A sketch of the locality, taken from a Coast Survey chart, accompanies this report.

LANSING H. BEACH.

[First indorsement.]

UNITED STATES ENGINEER OFFICE,
New York City, December 13, 1912.

The CHIEF OF ENGINEERS, UNITED STATES ARMY:

Forwarded, concurring in the views of the district officer.

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Division Engineer.

LETTER OF THE STANDARD GUANO CO.

BALTIMORE, MD., *November 2, 1912.*

SIR: Following our conversation of yesterday, we beg to state that as far as our two plants, the Standard Guano Co. and the Standard Wholesale Phosphate Co., are concerned, the deepening of the channel in Cabin Branch would aid us in the following manner:

The Standard Wholesale Phosphate Co. has taken in 5,609 tons of phosphate rock from Port Tampa since July 15, and it has been delivered to us by the following vessels: *Edward H. Cole* (two trips), *Jacob Luckenback*, *Julia Luckenback*, *D. N. Luckenback*, all of which vessels were only loaded a small portion of their capacity for us, as we had an insufficient depth of water to take these vessels loaded to anything like their full capacity.

We have already taken into our factory since July 15, 3,427 tons of sulphuric acid. We have contracted for 20,000 tons of phosphate rock per year for the next two years and 30,000 tons per year for the following three years; besides this, the above company takes a like quantity of sulphuric acid into their plant each of the five years referred to.

We have also taken into our plant 2,100 tons of fish and still have undelivered 700 tons, which will come to us between now and January 1 by vessel.

We have used since August 15 205 tons of lime, and have contracted to use 1,500 tons of this material per year.

We have bought 3,000 tons of tankage to be delivered between May 1, 1912, and May 1, 1913, and have already taken into our plant 1,409 tons; about 1,000 tons of what we have taken in has been handled by rail.

We have taken 800 tons of tobacco stems into the above plant since July 1, 1912, and have 500 tons more to come by cars and which could come by vessel at considerable saving to us.

We have bought for delivery between November 1, 1912, and July 1, 1913, 6,700 tons of potash salts, which comes in on the ocean liners from Germany and has to be lightered to our plant.

We also have bought 1,500 tons of sulphate of ammonia and use 1,000 tons of nitrate of soda, all of which comes in by water.

We have shipped very little goods from this plant since it was started, July 15, 1912, as we have been making a stock to be shipped the coming spring season.

We have sold 3,700 tons of goods to our retail trade in Maine, and have sold the E. D. Chittenden Co. 1,800 tons. All of the 5,500 tons to be shipped to Stockton Harbor, Me., and from there to our customers by rail. The E. D. Chittenden Co. have also purchased 5,000 additional tons to be shipped north of New York, and if we can secure suitable craft a good portion of this will be shipped by vessel. This you understand will have to be shipped in small crafts from our factory instead of in some of the larger vessels, which it is possible to secure at a very much better advantage, the trouble being that we can not dock a larger vessel at our wharf, due to the insufficient depth of the water.

We have sold 3,000 tons of acid phosphate to the Virginia-Carolina Chemical Co. and 3,000 tons to the Eastern Cotton Oil Co., all of which we expect to ship by schooner, and we have already delivered 1,500 tons to the Virginia-Carolina Chemical Co. and 405 tons to the Eastern Cotton Oil Co. via vessel. Both of the contracts referred to will be filled by March 1st.

Besides the above we sell 11,000 tons of acid phosphate to be delivered in the Baltimore Harbor.

The capacity of the above plant is 150,000 to 200,000 tons per year, and while the goods we have taken in and brought are considerably less than we will use we are positive of doubling this business next year, and feel sure that within five years we can be running our factory to full capacity, providing we are not handicapped by shallow water.

The Standard Guano Co. has a capacity of 50,000 tons per year and during 1912 has sold and delivered 28,600 tons and the prospect for an increase next year is unusually good. They shipped 8,000 tons by water last year.

The Monumental Shell Co. are doing a good business, and a good channel, say 25 feet, will enable all the established concerns to increase their business, and will be an incentive to new companies to locate on the excellent sites on Cabin Branch.

The goods handled by this company is about 1,000,000 to 1,500,000 tons per year, and the output of the Standard Guano Co. is $700,000 to $900,000 per year.

We have a great property at Curtis Bay, and feel that if you will give us a channel it will be of great benefit to the locality around Curtis Bay and to the Harbor of Baltimore, and we trust that you will see your way clear to give us this very important and much-needed channel.

Respectfully,

STANDARD GUANO CO.,
E. W. WEAKLEY, *Vice-President.*
STANDARD WHOLESALE PHOSPHATE CO.,
GEORGE A. WHITING, *President.*

Lieut. Col. L. H. BEACH,
Corps of Engineers.

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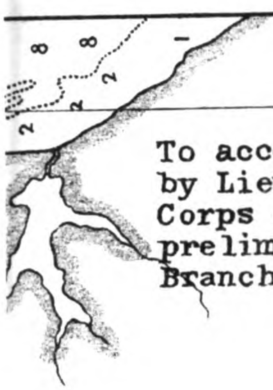
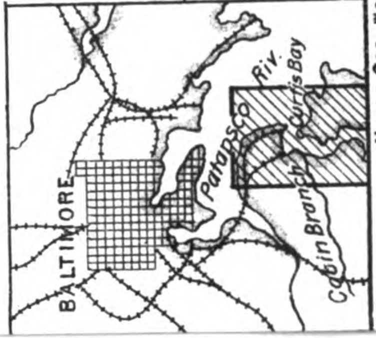


U.S. ENGINEER OFFICE,
Baltimore, Md.
December 12, 1912.

To accompany report of this date by Lieut. Col. Lansing H. Beach, Corps of Engineers, U.S. Army, on preliminary examination of Cabin Branch and Curtis Creek, Maryland.



House Doc. No. 1439; 62d Cong., 3d Sess.

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